PHILOSOPHICAL

TRANSACTIONS

OF THE

ROYAL SOCIETY

OF

LONDON.

FOR THE YEAR MDCCCXLIV.

PART II.

LONDON:

PRINTED BY RICHARD AND JOHN E. TAYLOR, RED LION COURT, FLEET STREET.

MDCCCXLIV.

Adjudication of the Medals of the Royal Society for the year 1844 by the President and Council.

The Copley Medal to Professor C. Matteucci of Pisa, for his various researches in Animal Electricity.

The Royal Medal, in the department of Mathematics, to George Boole, Esq., for his Paper entitled "On a general method in Analysis," published in the Philosophical Transactions for 1844.

The Royal Medal, in the department of Chemistry, to Thomas Andrews, M.D., for his Paper entitled "On the thermal changes accompanying Basic Substitutions," published in the Philosophical Transactions for 1844.

The Paper appointed for the Bakerian Lecture in 1844, is Professor Owen's, entitled "A description of certain Belemnites, preserved, with a great proportion of their soft parts, in the Oxford clay, at Christian-Malford, Wilts."

CONTENTS.

VII. *Contributions to Terrestrial Magnetism.—No. VI. By Lieut.-Colonel* Edward Sabine, *R.A., F.R.S.* . . . . . page 87

VIII. *On a General Method in Analysis. By* George Boole, *Esq. Communicated by* S. Hunter Christie, *Esq., Sec. R.S. &c.* 225

IX. *On the Reproduction of lost parts in Myriapoda and Insecta. By* George Newport, *Esq., F.R.C.S., President of the Entomological Society of London, and Corresponding Member of the Philomathic Society of Paris. Communicated by* P. M. Roget, *M.D., Sec. R.S.* 283

X. *On the Comparative Anatomy of the Thyroid Gland. By* John Simon, *Esq., Assistant-Surgeon to the King's College Hospital, and Demonstrator of Anatomy in King's College. Communicated by* Joseph Henry Green, *Esq., F.R.S., Senior Surgeon to St. Thomas's Hospital, Professor of Anatomy to the Royal Academy, &c. &c. &c.* 295

XI. *Researches into the Structure and Development of a newly discovered Parasitic Animalcule of the Human Skin—the* Entozoon folliculorum. *By* Erasmus Wilson, *Esq., Lecturer on Anatomy and Physiology in the Middlesex Hospital. Communicated by* Robert Bentley Todd, *M.D., F.R.S.* 305

XII. *Observations on some of the Nebulæ. By the Earl of* Rosse, *F.R.S., &c.* 321

Index 325

Appendix.

Presents . . . . . [1]

PHILOSOPHICAL TRANSACTIONS.

VII. *Contributions to Terrestrial Magnetism.—No. VI.*

By Lieut.-Colonel EDWARD SABINE, *R.A., F.R.S.*

Received April 17,—Read April 18, 1844.

§ 10. *Observations made on Board Her Majesty's Ships Erebus and Terror, from June* 1841 *to August* 1842, *in the Antarctic Expedition under the command of Captain Sir* JAMES CLARK ROSS, *R.N., F.R.S.*

I HAVE now to lay before the Royal Society the results of the Magnetic Observations made at sea by the Antarctic Expedition during the second year of its operations in the southern hemisphere. Leaving Hobarton early in July 1841, the ships proceeded in the first instance to Sydney in Australia, and from thence to the Bay of Islands in New Zealand, where they remained until the return of the season of navigation in the high latitudes. Quitting New Zealand in November, the ice was met with and entered in a somewhat lower latitude than in the preceding year, and in a longitude considerably to the east of the former track. The obstacles which the ice presented to their progress appear to have been greater than on the former occasion; they were however surmounted, and in February 1842 the ships again reached the ice barrier, or glacier, in latitude 78°, by which they had been stopped in the preceding year. After an unsuccessful endeavour to turn the eastern extremity of the glacier, the advance of the season compelled their return to the lower latitudes; they quitted the Antarctic Circle in March 1842, and keeping nearly in the 60th parallel, crossed the whole breadth of the southern Pacific Ocean to the Falkland Islands, where they arrived in April.

I proceed at once to the examination in detail of the magnetic observations made during this period.

Deductions of the Constants a and b in the Corrections for the Ship's attraction.

1. *In the Erebus.*—For the constants a and b to be employed in computing the corrections of the declination, we have the observations on each of the 32 principal points of the compass at Hobarton, in October 1840 and June 1841. We have also a similar series at Port Louis, in the Falkland Islands, in August 1842. The observations at Hobarton have been already discussed in No. V.* Those at Port Louis were as follows:—

August 19, 1842.

Ship's head by compass.	Disturbance towards the west.	Ship's head by compass.	Disturbance towards the west.	Ship's head by compass.	Disturbance towards the west.	Ship's head by compass.	Disturbance towards the west.
N.	+0° 12′·7	W.	−2° 15′·8	S.	+0° 00′·1	E.	+2° 07′·4
N. by W.	−0 04·1	W. by S.	−2 21·2	S. by E.	+0 43·9	E. by N.	+1 54·0
N.N.W.	−0 33·6	W.S.W.	−2 21·3	S.S.E.	+1 12·7	E.N.E.	+1 44·0
N.W. by N.	−0 50·1	S.W. by W.	−2 4·3	S.E. by S.	+1 41·4	N.E. by E.	+1 16·5
N.W.	−1 02·3	S.W.	−1 8·0	S.E.	+1 55·5	N.E.	+0 50·9
N.W. by W.	−1 00·6	S.W. by S.	−1 3·3	S.E. by E.	+2 06·9	N.E. by N.	+0 40·5
W.N.W.	−1 49·3	S.S.W.	−1 17·3	E.S.E.	+2 18·9	N.N.E.	+0 41·2
W. by N.	−2 09·6	S. by W.	−0 38·6	E. by S.	+2 16·4	N. by E.	+0 27·7

The values of the constants deduced from the observations at Hobarton were, $a=+\cdot0272$; $b=+\cdot986$. The values from the observations at the Falkland Islands are, $a=+\cdot0292$; $b=+\cdot984$.

The values of a at Hobarton were derived from two series, one in October 1840, when the ship had recently passed through the low magnetic latitudes, and the other in June 1841, on her return from the highest magnetic latitudes of the southern hemisphere; the two series separately considered give $a=+\cdot0235$ in 1840, and ·0309 in 1841; we have therefore the following values:—

+·0267 in the Thames, where the ship had been stationary for several years.

+·0235 at Hobarton, on her first arrival from the low latitudes.

+·0305 on her return to Hobarton from the very high southern magnetic latitudes.

+·0292 at the Falkland Islands in 1842, on her second return from the very high southern latitudes.

The variations in these values is in accordance with the view expressed in the preceding Number of these Contributions†, that when a ship changes her magnetic latitude, the corresponding change in the induced portion of her magnetism may not be instantaneous; that some portions of her iron may be of a quality intermediate between perfectly soft iron, which would undergo instantaneous change, and iron permanently magnetic; and that when changing rapidly her geographical position, she may be liable to be more or less in arrear, in regard to her magnetic condition, of her actual locality at any particular time. In a ship in which this should be the case, a table computed with any one value of a would not apply equally to one portion

* Philosophical Transactions, 1843, Part II. pp. 152–154. † Ibid. pp. 152, 153.

of her voyage in which she might be sailing from lower into higher inclinations, and to another portion in which she might be returning from higher into lower magnetic latitudes. The voyage under consideration comprised two such portions; and I have therefore employed two tables for the Erebus, one computed with ·0267 for the period when the ship was increasing the dip, and the other with ·0288 for the period when she was decreasing the dip. The differences are insignificant, except when the inclination is very high; the greater part of the declinations observed in the high dips were antecedent to the 1st of March 1842, when the ship commenced her return to the lower latitudes; for these the table computed with $a = \cdot 0267$ has been employed, and appears to answer better than the corrections computed either by the values resulting from the observations at Hobarton before the commencement, or by those at the Falkland Islands after the conclusion of the voyage.

2. *In the Terror.*—For the values of a and b in the Terror, we have observations on each of the thirty-two principal points of the compass at Hobarton in October 1840, and a second series in June 1841, as follows:—

Ship's head by compass.	Disturbance towards the west.			Ship's head by compass.	Disturbance towards the west.		
	1840.	1841.	Mean.		1840.	1841.	Mean.
N.	+0° 42′·4	−0° 52′	−0° 05′	S.	−0° 11′·6	−0° 55′	−0° 33′
N. by W.	−0 23·6	−0 52	−0 38	S. by E.	+0 52·4	−0 06	+0 23
N.N.W.	−1 20·6	−0 59	−1 10	S.S.E.	+1 56·4	+0 43	+1 20
N.W. by N.	−2 20·6	−0 03	−1 12	S.E. by S.	+2 38·4	+2 08	+2 23
N.W.	−3 25·6	−0 58	−2 12	S.E.	+3 19·4	+2 57	+3 08
N.W. by W.	−3 56·6	−2 12	−3 04	S.E. by E.	+4 00·4	+3 48	+3 54
W.N.W.	−4 01·6	−2 26	−3 14	E.S.E.	+4 43·4	+5 25	+4 54
W. by N.	−4 06·6	−2 51	−3 29	E. by S.	+4 28·4	+4 58	+4 43
W.	−4 36·6	−3 34	−4 06	E.	+4 24·4	+4 27	+4 26
W. by S.	−4 44·6	−3 43	−4 14	E. by N.	+4 11·4	+4 02	+4 07
W.S.W.	−4 52·6	−4 34	−4 43	E.N.E.	+4 07·4	+3 27	+3 47
S.W. by W.	−5 22·6	−4 01	−4 42	N.E. by E.	+3 27·4	+3 04	+3 16
S.W.	−4 23·6	−3 50	−4 07	N.E.	+3 02·4	+3 01	+3 02
S.W. by S.	−3 31·6	−4 22	−3 57	N.E. by N.	+2 37·4	+2 27	+2 32
S.S.W.	−2 03·6	−3 41	−2 52	N.N.E.	+2 11·4	+0 46	+1 29
S. by W.	−1 37·6	−2 44	−1 11	N. by E.	+1 26·4	−0 12	+0 37

We have also a series at Port Louis, in the Falkland Islands, in August 1842, as follows:—

Ship's head by compass.	Disturbance towards the west.	Ship's head by compass.	Disturbance towards the west.	Ship's head by compass.	Disturbance towards the west.	Ship's head by compass.	Disturbance towards the west.
N.	+0° 19′	W.	−2° 30′	S.	−0° 16′	E.	+2° 46′
N. by W.	−0 02	W. by S.	−2 21	S. by E.	−0 08	E. by N.	+2 27
N.N.W.	−0 17	W.S.W.	−2 12	S.S.E.	0 00	E.N.E.	+1 58
N.W. by N.	−0 48	S.W. by W.	−2 21	S.E. by E.	+0 47	N.E. by E.	+1 39
N.W.	−1 19	S.W.	−1 33	S.E.	+1 35	N.E.	+1 13
N.W. by W.	−1 49	S.W. by S.	−1 05	S.E. by E.	+2 17	N.E. by N.	+1 11
W.N.W.	−1 47	S.S.W.	−0 47	E.S.E.	+3 04	N.N.E.	+0 34
W. by N.	−2 07	S. by W.	−0 45	E. by S.	+2 33	N. by E.	+0 27

From these observations we have the following values of the constants:—

Hobarton . . . . . $a=+\cdot0275$; $b=+\cdot979$
Falkland Islands . . . $a=+\cdot0293$; $b=+\cdot994$.

These values are nearly the same as those derived from the observations in the Erebus at the same periods, and appear to require no special remark; the same tables have been employed in the declination corrections of both ships during the voyage under notice; the values of the constants in these tables were as follows:—

$a=\cdot0267$ when the ships were sailing from the lower into the higher latitudes; $a=\cdot0288$ when sailing from the higher into the lower latitudes; $b=+\cdot984$ in both cases.

Deduction of the Corrections on account of the Ship's attraction for the Observations of Inclination.

1. *In the Erebus.*—The spot in the ship in which Mr. Fox's apparatus for the observations of inclination and intensity was employed, was a few feet in advance (towards the bow), and about two feet lower in height, than the position of the standard compass.

The values of a and b derived from the observations with the compass needle apply in strictness only to the spot in which that compass was stationed; it may be proper, therefore, before we employ them for the observations with Mr. Fox's apparatus, to show that nearly similar values for the constant a in particular (the more important constant) are deducible from the observations of inclination and intensity, independently of those made with the compass needle. For this purpose we may employ equation (1.), Phil. Trans., 1843, Part II. p. 147, viz.

$$\frac{\varphi'}{A'\varphi}\cos\theta'\cos\zeta'=\cos\theta\cos\zeta+a\sin\theta,$$

obtaining by its means the value of a from the observations of inclination and intensity made at Hobarton and Port Louis. As A′ is known to differ very slightly, if at all, from unity, we have from equation (1.),

$$a\sin\theta=\frac{\varphi'}{\varphi}\cos\theta'\cos\zeta'-\cos\theta\cos\zeta.$$

φ and θ are furnished by the mean of the observations of inclination and intensity on the sixteen points of the compass, having approximate corrections applied to each of them; φ' and θ' by the (uncorrected) observations on the different points.

From the general aspect of the observations at both stations, we may conclude that the same symmetrical distribution of the iron existed in reference to the position of Mr. Fox's apparatus as in the case of the standard compass, and consequently that at the north and south points the value of ζ' and ζ coincided, being equal in the one case to 0°, and in the other to 180°. At Hobarton (in June 1841) we have $\varphi=1\cdot83$, $\theta=-70°\,39'$; φ' at north $1\cdot812$, at south $1\cdot854$; θ' at north $-71°\,56'$, at south $-69°\,14'$:

Hence $\left.\begin{array}{l}\text{at north, } -\cdot944a=+\cdot307-\cdot331\\ \text{at south, } -\cdot944a=-\cdot359+\cdot331\end{array}\right\}$; whence $a=+\cdot0275$.

At Port Louis (August 1842) we have $\varphi=1\cdot32$; $\theta=-52^\circ\ 05'$; φ' at north $=1\cdot279$, at south $=1\cdot346$; θ' at north $=-52^\circ\ 50'$, at south $=-51^\circ\ 33'$; hence

$$\left.\begin{array}{l}\text{at north, } -\cdot789a=+\cdot5920-\cdot615\\ \text{at south, } -\cdot788a=-\cdot6367+\cdot615\end{array}\right\}\text{; whence } a=+\cdot0310.$$

The accordance between these values and those deduced from the observations with the standard compass is fully sufficient to justify the inference that the effect of the ship's attraction was very nearly the same at the spot where Mr. Fox's apparatus was used, as at that at which the standard compass was fixed.

We may obtain c either by equation (11.), Phil. Trans., 1843, Part II. p. 148,

$$c\cos\zeta+d\tan\theta=\sqrt{(\cos\zeta+a\tan\theta)^2+b^2\sin^2\zeta}.\tan\theta';$$

or from the observations of inclination and intensity, independently of the values of a and b, by the equation

$$\frac{\varphi'}{\varphi}\sin\theta'=c\cos\theta\cos\zeta-d\sin\theta.$$

Confining ourselves to the north and south points, and to those points on either side of N. and S. from which c may be most advantageously derived, the observations at Hobarton give the following values to be employed in the equations:

N.; $\zeta'=0$; $\zeta=0$; $\theta=-71^\circ\ 56'$; $\varphi'=1\cdot812$.

N.N.E. / N.N.W.; $\zeta'=22^\circ\ 30'$; $\zeta=21^\circ\ 03'$; $\theta=-71^\circ\ 55'$; $\varphi'=1\cdot812$.

N.E. / N.W.; $\zeta'=45^\circ\ 0'$; $\zeta=42^\circ\ 12'$; $\theta=-71^\circ\ 48'$; $\varphi'=1\cdot816$.

S.E. / S.W.; $\zeta'=135^\circ\ 0'$; $\zeta=131^\circ\ 17'$; $\theta=-69^\circ\ 56'$; $\varphi'=1\cdot847$.

S.S.E. / S.S.W.; $\zeta'=157^\circ\ 30'$; $\zeta=155^\circ\ 24'$; $\theta=-69^\circ\ 38'$; $\varphi'=1\cdot850$.

S; $\zeta'=180^\circ\ 0'$; $\zeta=180^\circ\ 0'$; $\theta-69^\circ\ 14'$; $\varphi'=1\cdot854$.
$\theta=-70^\circ\ 39'$; $\varphi=1\cdot83$.

Substituting these values in the first of the above equations (11.), we have at

N. $1\cdot000c-2\cdot85d=-2\cdot828$;

N.N.E. / N.W. $\cdot934c-2\cdot85d=-2\cdot832$;

N.E. / N.W. $\cdot741c-2\cdot85d=-2\cdot841$;

S.E. / S.W. $\cdot660c-2\cdot85d=-2\cdot853$;

$$\left.\begin{matrix}\text{S.S.E.}\\ \text{S.S.W.}\end{matrix}\right\} -\cdot 909c - 2\cdot 85d = -2\cdot 876;$$
$$\text{S.} \quad -1\cdot 000c - 2\cdot 85d = -2\cdot 843.$$

Changing the signs of the three last equations, and summing, we have

$$5\cdot 24c = +\cdot 071;$$

whence $c = +\cdot 014$.

To obtain c from the observations of inclination and intensity alone, we have at

$$\text{N.} \quad \cdot 331c - \cdot 94d = -\cdot 941;$$
$$\left.\begin{matrix}\text{N.N.E.}\\ \text{N.N.W.}\end{matrix}\right\} \cdot 309c - \cdot 94d = -\cdot 942;$$
$$\left.\begin{matrix}\text{N.E.}\\ \text{N.W.}\end{matrix}\right\} \cdot 222c - \cdot 94d = -\cdot 943;$$
$$\left.\begin{matrix}\text{S.E.}\\ \text{S.W.}\end{matrix}\right\} -\cdot 218c - \cdot 94d = -\cdot 948;$$
$$\left.\begin{matrix}\text{S.S.E.}\\ \text{S.S.W.}\end{matrix}\right\} -\cdot 301c - \cdot 94d = -\cdot 948;$$
$$\text{S.} \quad -\cdot 331c - \cdot 94d = -\cdot 947.$$

Changing the signs of the three last equations, and summing, d is eliminated as before, and

$$c = \frac{+\cdot 017}{1\cdot 71} = +\cdot 010.$$

From the observations at Port Louis, we have the following values to be employed in the equations:

$$\text{N.} \quad \zeta' = 0; \quad \zeta = 0; \quad \theta' = -52^\circ\ 50'; \quad \varphi' = 1\cdot 279;$$
$$\left.\begin{matrix}\text{N.N.E.}\\ \text{N.N.W.}\end{matrix}\right\} \zeta' = 22^\circ\ 30'; \ \zeta = 22^\circ\ 01'; \ \theta' = -52^\circ\ 42'; \ \varphi' = 1\cdot 290;$$
$$\left.\begin{matrix}\text{N.E.}\\ \text{N.W.}\end{matrix}\right\} \zeta' = 45^\circ\ 0'; \ \zeta = 43^\circ\ 58'; \ \theta' = -52^\circ\ 45'; \ \varphi' = 1\cdot 290;$$
$$\left.\begin{matrix}\text{S.E.}\\ \text{S.W.}\end{matrix}\right\} \zeta' = 135^\circ\ 0'; \ \zeta = 133^\circ\ 03'; \ \theta' = -51^\circ\ 59'; \ \varphi' = 1\cdot 323.$$
$$\left.\begin{matrix}\text{S.S.E.}\\ \text{S.S.W.}\end{matrix}\right\} \zeta' = 157^\circ\ 30'; \ \zeta = 155^\circ\ 52'; \ \theta' = -51^\circ\ 33'; \ \varphi' = 1\cdot 330.$$
$$\text{S.} \quad \zeta' = 0; \quad \zeta = 0; \quad \theta' = -51^\circ\ 43'; \ \varphi' = 1\cdot 346.$$
$$\theta = -52^\circ\ 05'; \ \varphi = 1\cdot 32.$$

Substituting these values in equation (11.), we obtain

$$c = \frac{+\cdot 094}{5\cdot 24} = +\cdot 018;$$

or from the observations of inclination and intensity alone,

$$c = \frac{+\cdot 051}{3\cdot 22} = +\cdot 016.$$

The correspondence in the value of the constants obtained from the observations at Hobarton and Port Louis, being the commencing and concluding stations of the voyage now under consideration, is fully as good as could be desired; and a table formed from them has been employed for the correction of the observations made between Hobarton and the Bay of Islands, and during the return of the Expedition from the high latitudes to the Falkland Islands commencing with the 1st of March 1842. In those portions of the voyage the ship was passing from the higher to the lower magnetic latitudes, in which circumstance they corresponded with the observations at Hobarton and Port Louis, which were both made on the return from the vicinity of the magnetic pole. But if we attempt to apply the same table to the observations made under the reverse circumstances, namely, when the ship was passing from the lower to the higher latitudes (and such was the case with the greater part of the observations which we have to correct in the present voyage), we find that the tabular numbers, where the N. and S. points are approached, furnish a decided over compensation. On days when observations have been made at or near the N. and S. points, if we seek in the table for the corrections which should bring the results in accord with each other, we find that the corrections which will do so belong to a dip which is always some degrees less than the true terrestrial dip. It appeared desirable, therefore, if possible, to form a table for the correction of the observations of this portion of the voyage, derived from those observations themselves. Fortunately we have a better opportunity of doing this than might have been anticipated. The progress of the Expedition was so much impeded by ice in the early part of January 1842, that from the 6th to the 16th inclusive, the Erebus was the whole time between the latitudes of $-65° 54'$ and $-66° 14'$, and between the longitudes of $204° 33'$ and $202° 02'$; the weather and all other circumstances being favourable, the inclination was observed in the course of those eleven days with the ship's head on seventeen different points of the compass, sufficiently distributed, and particularly towards the north points and south points, where the effect of the ship's attraction is greatest, and is in opposite directions. From the observations at north and south it is not difficult to obtain an approximate value of a, which should bring the corrected results at those points into accord. The value thus obtained is about $+\cdot 023$. I have collected the observations during the period referred to into the following table, taking, for the sake of simplicity, only those observations which were made by the *direct* method, which, however, comprises by far the greater part of the observations of that period. I have then computed the corrections, first, with the values of the constants, such as they are given by the observations made for their determination at Hobarton and the Falkland Islands (being the commencement and close of the voyage), viz. $a=+\cdot 028$; $b=+\cdot 984$; $c=+\cdot 015$ and $d=1$; and second, with $a=+\cdot 023$, b, c and d, as before; and have placed the two series of corrected results in the table, with columns showing in both cases the difference of the corrected result, on each point, from the mean result. A comparison of those columns seems conclusive in favour of the application

of the smaller value of a to those observations which were made when the ship was in progress from the lower to the higher latitudes. If a be taken as it was found at Hobarton and the Falkland Islands, not only are the differences generally greater, but they are systematically so; evidencing an over compensation where the north and south points are approached; whilst with the smaller value of a the differences are greatly diminished in amount, and exhibit no appearance whatsoever of system. They are such as may well be supposed to have been occasioned partly by observation error, and partly by small differences of geographical position in which the observations themselves were made.

Ship's head by compass.	Number of observations.	Inclination observed.	Values of the Constants. $a=+\cdot028$. $b=+\cdot984$; $c=+\cdot015$; $d=1$.			Values of the Constants. $a=+\cdot023$. $b=+\cdot984$; $c=+\cdot015$; $d=1$.		
			Computed corrections.	Inclinations corrected.	$\alpha-\beta$.	Computed corrections.	Inclinations corrected.	$\alpha-\beta$.
				β.			β.	
N.	1	−80° 58′	+1° 32′	−79° 26′	−20′	+1° 16′	−79° 42′	− 3′
N.N.E.	2	−81 00	+1 27	−79 33	−13	+1 12	−79 48	+ 3
N.E.	2	−80 42	+1 12	−79 30	−26	+1 00	−79 42	− 3
N.W.	3	−80 35	+1 12	−79 23	−23	+1 00	−79 35	−10
N.E. by E.	2	−80 50	+1 01	−79 49	+ 3	+0 55	−79 55	+10
W.	1	−79 58	+0 17	−79 41	− 5	+0 14	−79 44	− 1
E.	3	−79 50	+0 17	−79 33	−13	+0 14	−79 36	− 9
E. by S.	1	−79 45	−0 01	−79 46	−00	−0 01	−79 46	+ 1
S.W. by W.	3	−79 19	−0 38	−79 57	+11	−0 31	−79 50	+ 5
S.W. $\frac{3}{4}$ W.	1	−79 30	−0 42	−80 12	+26	−0 34	−80 04	+19
S.W. $\frac{1}{2}$ W.	1	−79 10	−0 46	−79 56	+10	−0 38	−79 48	+ 3
S.E.	1	−79 08	−0 55	−80 03	+17	−0 45	−79 53	+ 8
S.W.	3	−78 52	−0 55	−79 47	+ 1	−0 45	−79 37	− 8
S.W. $\frac{1}{2}$ S.	1	−78 48	−1 02	−79 50	+ 4	−0 50	−79 38	− 7
S.S.E.	3	−78 28	−1 13	−79 41	− 5	−1 05	−79 33	−12
S. by W.	3	−78 28	−1 29	−79 57	+11	−1 13	−79 41	− 2
S.	5	−78 32	−1 31	−80 03	+17	−1 14	−79 46	+ 1
Means	36	....	....	−79 46=α		....	−79 45=α	

The mean of the observations in the table thus corrected is −79° 45′; the corresponding geographical position is −66° 04′, and 203° 17′·5, if we take as such the middle point of the geographical space in which the ship was detained from the 6th to the 16th of January. The inclination observed on the ice on the 16th of January, in lat. −65° 49′, long. 202° 02′, with needles whose poles were reversed, was −79° 39′·5. We can derive no *precise* conclusion in regard to the value of d, from observations which are not identical in locality; but the accordance of the results obtained on board and on the ice, in geographical positions so little different, is quite sufficient to show that the error involved by assuming d as unity must be, at the utmost, very inconsiderable.

The tables for the correction of the inclination in the Erebus have therefore been computed with the following values for the constants, viz. from New Zealand to the end of February 1842, being the portion of the voyage in which the ship was in pro-

gress from the lower into the higher inclinations, $a=+\cdot023$, $b=+\cdot984$, $c=+\cdot015$ and $d=1$: and for the remainder of the voyage $a=+\cdot028$, b, c and d, as before.

In the Terror.—The place in which Mr. Fox's apparatus was used in the Terror was about the same distance from the position of the standard compass, and in the same direction, as in the Erebus. A series of observations were made with it for the purpose of furnishing materials for the determination of the constants, at Hobarton in June 1841, and at the Falkland Islands in August 1842; and the inclination was also observed with the ship's head on several points of the compass during the detention of the ships by the ice between the 6th and 16th of January 1842. In the case of the Erebus, we have found these latter observations of principal use in furnishing the values of the constants which apply to the greater part of the observations of the voyage; it may, therefore, be advisable to commence with the discussion of the corresponding series in the Terror.

Inclinations observed on board Her Majesty's ship Terror with needle F.C.B. used direct, during her detention by the ice from the 6th to the 16th of January 1842, between the latitudes of $-65°\ 45'$ and $-66°\ 20'$, and longitudes of $201°\ 46'$ and $204°\ 04'$.

Ship's head by compass.	Number of observations.	Inclination observed.	Ship's head by compass.	Number of observations.	Inclination observed.
		° ′			° ′
N.	4	−81 19·5	S.	6	−78 30
N. ½ E.	2	−81 14	S. ¾ W.	1	−78 21
N. ¾ E.	1	−80 50	S. by W.	1	−78 48
N.N.E.	3	−80 57	S.W.byW.½W.	1	−78 50
N.E.	2	−80 48	S.W. by S.	3	−79 00
N.E. by E.	1	−80 26	S.W.	3	−79 08
E. ½ N.	1	−79 57	S.W. ½ W.	1	−79 08
E.	6	−79 55	S.W. by W.	5	−79 21
E. ½ S.	1	−79 45	W.S.W.	2	−79 37
E. by S.	1	−79 33	W. by S.	1	−80 05
E.S.E.	2	−79 21	W. ¼ S.	2	−80 07
S.E. by E. ½ E.	1	−79 04	N.W.	2	−81 09
S.S.E.	1	−78 42	N. by W.	1	−81 15
S. by E.	4	−78 37			

These observations manifest the general systematic character of the disturbance occasioned by the ship's attraction; they furnish indeed a remarkable example of the success with which the effect of the ship's iron on the inclination may be investigated by observations made at sea. The disturbance appears to have not been strictly symmetrical, inasmuch as the inclinations observed on the western points somewhat exceed in amount those observed on the corresponding eastern points; the same circumstance took place in the observations at Hobarton; but at the Falkland Islands, on the contrary, the inclinations observed on the eastern points were generally somewhat the higher. A similar occasional departure from strict symmetry has before been noticed in the effect of the ship's iron on the compass needle*; in that case also

* Philosophical Transactions, 1843, Part II. p. 152.

the disturbance in the same ship was sometimes greater on the eastern, and sometimes on the western points; these small irregularities, having no uniform character, are regarded as included amongst those varying accidents which are classed generally under the name of observation error. It is proper, however, in consequence of this occasional irregularity, that the data from which constants are to be derived for general corrections should consist of the mean of observations on corresponding points on the east and west sides of the compass; in this view we have as available observations in the preceding table those on the following points of the compass.

North	−81° 19′·5
N.W. and N.E.	−80 58·5
W. ¼ S. and E. ¼ S. (from E. and E. ½ S.)	−79 58·5
W. by S. and E. by S.	−79 49
W.S.W. and E.S.E.	−79 29
S.W. and S.E. (from E.S.E. and S.S.E.)	−79 04·5
South	−78 30

We have here 2° 49′·5 for the difference between the inclinations observed with the ship's head north and south; the value of a which will give that amount for the sum of the corrections at north and south when the dip is between −79° and −80°, (neglecting c as too small in such case to require consideration), is about +·026. The observations at north were four in number,—those at south six, and on different days,—they were as follows:—

North.		South.	
January 8,	−81° 19′	January 7,	−78° 28′
8,	−81 20	8,	−78 31
8,	−81 18	11,	−78 28
13,	−81 21	13,	−78 25
		13,	−78 33
Mean	81 19·5	14,	−78 34
		Mean	78 30

From the accord which these observations respectively exhibit, it is clear that we should not be justified in taking a value of a which should differ much from +·026.

If we now refer to the observations which were made in the Terror soon after her arrival at the Falkland Islands, when the ship's head was placed on the principal points of the compass for the purpose of determining the values of the constants, we shall

find that a value of a taken near $+\cdot026$ will by no means bring the results on the N. and S. points, or on those approaching the N. and S. points, into accord; and that as we have already found in the dip corrections of the Erebus, and in the declination corrections of both ships, a considerably higher value of a is required for the observations on the return from the high latitudes, than for those when the ship was in progress from the lower to the higher dips.

We have no observations at the Falkland Islands (made at the spot in the ship where Mr. Fox's apparatus was used) either of the direction of the compass needle, or of the force acting on the horizontal needle: we must therefore obtain a and b directly from the observations of Inclination and Intensity. The observations gave as follows:—

Ship's head.	Inclination observed. $\delta = -51^\circ\ 56'$.		Intensity observed. $\varphi = 1\cdot336$.	
	δ'		φ'	
N.	$-52^\circ\ 46'\cdot5$	$-52^\circ\ 46'\cdot5$	1·320	1·320
N.N.E.	$-52\ 51$	$-52\ 47$	1·315	1·314
N.N.W.	$-52\ 43$		1·313	
N.E.	$-52\ 47$	$-52\ 46$	1·314	1·313
N.W.	$-52\ 45$		1·312	
E.N.E.	$-52\ 52$	$-52\ 45$	1·336	1·322
W.N.W.	$-52\ 38$		1·308	
E.	$-52\ 31$	$-52\ 22$	1·336	1·330
W.	$-52\ 13$		1·324	
E.S.E.	$-52\ 16$	$-52\ 01$	1·355	1·350
W.S.W.	$-51\ 46$		1·345	
S.E.	$-51\ 32$	$-51\ 32$	1·370	1·364
S.W.	$-51\ 32$		1·359	
S.S.E.	$-51\ 09$	$-51\ 15$	1·368	1·367
S.S.W.	$-51\ 21$		1·366	
S.	$-50\ 53$	$-50\ 53$	1·370	1·370

For a, we have from equation (1.),

$$a\sin\theta = \frac{\varphi'}{\varphi}\cos\theta'\cos\zeta' - \cos\theta\cos\zeta,$$

whence we obtain, from the observations on the N. and S. points, $a = +\cdot0311$, and from those on the N.N.E. and N.N.W., S.S.E. and S.S.W. points, a also $= +\cdot0311$.

In the Erebus we have found a for the spot in the ship where Mr. Fox's apparatus was used $= +\cdot023$, from the observations made when the ship was in progress to the southward; and $= +\cdot029$ at Hobarton and the Falkland Islands. The corresponding values in the Terror are $+\cdot026$ and $+\cdot031$.

In the case of the Terror, therefore, I have employed separate tables for the corrections for the ship's attraction, viz. a taken as $+\cdot028$ in the passage from Hobarton to New Zealand; as $+\cdot026$ in the passage to the higher latitudes; and as $+\cdot031$ during the return from the high latitudes to the Falkland Islands.

For b and c, we obtain from the observations at the Falkland Islands as follows:— In the case of b, we have from equation (2.),

$$b\cos\theta = \frac{\varphi'}{\varphi}\cos\theta'\sin\zeta'\operatorname{cosec}\zeta;$$

the observations at N.E., N.W., S.E. and S.W. give $b=+\cdot984$; those at E.N.E., W.N.W., E.S.E. and W.S.W., $b=\cdot984$; and those at E. and W. $b=\cdot982$.

In the case of c, we have from equation (3.),

$$\frac{\varphi'}{\varphi}\sin\theta'=c\cos\theta\cos\zeta+d\sin\theta;$$

from the observations at N. to N.E. and N.W. inclusive, and from S. to S.E. and S.W. inclusive, eliminating d, we have

$$c=+\cdot009.$$

The constant d is perhaps the most difficult of the constants to ascertain satisfactorily, as its value derivable from the observations depends on a knowledge of the true geographical dip at the place of observation, free from what is now known as *station error*. Experience has fully shown the general fact, that inclinations observed on land cannot safely be assumed as free from local disturbance. The discrepancies of gravitation at the Falkland Islands are well known from the experiments with the pendulum; and from the geological character of these islands, we might be prepared to expect the existence of magnetic discrepancies also. By the needles in both ships, the inclination was found a third of a degree higher at the magnetic observatory on shore than when observed on board in the harbour; if the observatory dip were to be assumed as an undisturbed one, we should obtain d in both ships considerably less than unity, whereas from the comparison of the observations in both ships in the preceding December and January, with the inclination observed at the same time on the ice over a deep sea, where no local attraction can be imagined to exist, we have d (as far as the small differences of geographical position will permit us to judge) differing scarcely, if at all, from unity in either ship. The preference is certainly due to the deduction from the results obtained on the ice. Taking therefore $d=1$, $c=+\cdot01$, $b=\cdot984$ and $a=+\cdot026$, we have the corrections, and the corrected inclination, of the observations in the Terror between the 6th and 16th of January as follows:

Ship's head.	No. of observations.	Inclination observed.	Correction.	Corrected Inclination.	
N.	4	−81 19·5	+1 26	−79 53·5	
N.W.	4	−80 58·5	+1 09	−79 49·5	
N.E.					
W. ¼ S.	9	−79 58·5	+0 12	−79 46·5	
E. ¼ S.					
W. by S.		−79 49·0	−0 01	−79 50·0	−79° 52′·4
E. by S.					
W.S.W.	4	−79 29·0	−0 17·5	−79 56·5	
E.S.E.					
S.W.	6	−79 04·5	−0 51·5	−79 56·0	
S.E.					
S.	6	−78 30·0	−1 24·5	−79 54·5	

Slight differences in the corrected results must be looked for, as the observations were not all taken precisely at the same geographical spot: those which appear in the table are, however, very slight; the accord produced by the corrections seems as

satisfactory as could be wished or expected; and I have accordingly taken the above stated values of *b*, *c*, and *d*, for the whole period under notice.

On a general review of the examination to which the observations in the Erebus and Terror in this and the preceding voyage have been subjected, in reference to the magnetic influence of their iron, we find reason to conclude from the consistent experience of both voyages, that the disturbance in them was altogether such as would be occasioned by the magnetism induced in the soft iron of the ship by the magnetism of the earth,—if we permit ourselves to include as possessing the quality of softness, certain portions of iron which, though not permanently magnetic, do still retain polarity, and require some time to conform to the changes in magnetical relations induced by changes of geographical position. It is not improbable that this may be a general case in sailing vessels similar to the Erebus and Terror; but we should by no means be warranted in deriving a corresponding inference in regard to ships which contain steam machinery, and still less in the case of iron vessels. These may possibly possess permanent magnetism strictly so called; in addition to induced magnetism, and temporarily-abiding polarity. It is very desirable that we should have some means of judging of what may be expected in vessels of these two classes. The knowledge would be valuable were it only for the compass corrections necessary for the ordinary purposes of navigation; and it appears indispensable before a correct judgment can be formed of the confidence to which methods may be entitled, which have been already, or may hereafter be devised, to supersede these corrections by the employment of compensating forces. It is not necessary that steam or iron-built ships should perform voyages like those of the Erebus and Terror to procure this knowledge; a voyage from the British Channel to the Tropics would be sufficient; the ship should be swung before her departure from these islands, and immediately on her arrival in the Tropics, and at intervals of three or six months during her continuance there; the experiment should also be repeated on her return to England before any material alteration is made in the distribution of her iron.

Index Correction.

Index Correction of R. F. 5 *for the Observations of the Inclination in the Erebus.*—The observations at sea with this needle having been made in the one position of the instrument only, viz. with the face of the circle towards the east, and the marked side of the needle towards the observer,—we have to obtain the index correction, by comparing the inclinations observed in the same manner on shore, or on the ice, with the results given at the same places by needles of which the poles were reversed and the needle and circle used in the eight ordinary positions.

The stations which furnish this comparison are Hobarton, Sydney, New Zealand, the Falkland Islands, and two stations on the ice in the latitudes of $-63^\circ\ 23'$ and $-65^\circ\ 49'$. The results of the observations at Hobarton with needles with which the complete process for determining the inclination was gone through, were given in No. V. of these Contributions*. Those at the other five stations are as follows:—

* Philosophical Transactions, 1843, Part II. p. 165.

Observations of the Inclination, with Needles whose Poles were reversed, made at Garden Island, Sydney, July 1841.

Date.	Hour.	Needle.	Poles. α direct. β reversed.	Mean.	Remarks.
1841.	h m		° ′	° ′	
July 20.	9 20 A.M.	R 4	α −62 52·5	−62 49·5	Needles belonging to H.M.S. Erebus.
			β −62 46·5		
20.	10 45 A.M.	R 10	α −62 57·5	−62 45·6	
			β −62 33·7		
20.	1 00 P.M.	R 6	α −62 50·1	−62 54·3	
			β −62 58·5		
20.	2 15 P.M.	R 7	α −62 53·9	−62 52·9	
			β −62 51·9		
20.	9 00 A.M.	C 1	α −62 48·2	−62 46·9	Needles belonging to H.M.S. Terror.
			β −62 45·6		
		C 2	α −62 49·6	−62 45·1	
			β −62 40·5		
				−62 49·1	General Mean.

Observations of the Inclination, with Needles whose Poles were reversed, made at the Bay of Islands, New Zealand, August to November 1841.

Date.	Hour.	Needle.	Poles. α direct. β reversed.	Mean.	Remarks.
1841.	h m		° ′	° ′	
August 23.	2 10 P.M.	R 10	α −59 46·1	−59 31·5	Needles belonging to H.M.S. Erebus.
			β −59 16·9		
23.	3 10 P.M.	R 4	α −59 38·5	−59 33·0	
			β −59 27·5		
24.	8 40 A.M.	R 4	α −59 38·4	−59 32·1	
			β −59 25·8		
24.	9 45 A.M.	R 10	α −59 53·9	−59 37·4	
			β −59 21·3		
24.	11 00 A.M.	R 6	α −59 28·8	−59 31·4	
			β −59 34·0		
24.	1 10 P.M.	R 7	α −59 30·3	−59 30·4	
			β −59 30·6		
October 5.	4 00 P.M.	R 4	α −59 39·7	−59 33·5	
			β −59 27·3		
12.	7 00 A.M.	R 4	α −59 35·2	−59 31·8	
			β −59 27·9		
26.	6 35 A.M.	R 4	α −59 35·7	−59 31·9	
			β −59 28·1		
26.	9 35 A.M.	R 10	α −59 50·5	−59 38·5	
			β −59 26·6		
26.	10 35 A.M.	R 6	α −59 30·1	−59 30·8	
			β −59 31·4		
26.	1 30 P.M.	R 7	α −59 32·4	−59 34·3	
			β −59 36·2		
August 23.	9 00 A.M.	C 1	α −59 30·0	−59 28·9	Needles belonging to H.M.S. Terror.
			β −59 27·8		
23.	11 30 A.M.	C 2	α −59 31·4	−59 27·0	
			β −59 22·7		
November 6.	9 00 A.M.	C 1	α −59 32·5	−59 30·3	
			β −59 28·1		
6.	10 30 A.M.	C 2	α −59 32·8	−59 26·8	
			β −59 20·8		
				−59 31·9	General Mean.

Observations of the Inclination with Needles whose Poles were reversed, made on the ice.

Date.	Lat.	Long.	Needle.	Poles. α direct. β reversed.	Mean.		Remarks.
1841.					° ′	° ′	
December 19.	−63 23	210 02	R 4	α −77 23·1	−77 23·3	−77 23·3	Needles belonging to H.M.S. Erebus.
				β −77 23·4			
23.	−65 59	204 14	R 4	α −79 32·0	−79 28·4		
				β −79 24·7			
23.	−65 59	204 14	R 6	α −79 35·6		−79 31·0	
				β −79 31·5	−79 33·6		
1842.							
January 16.	−65 49	202 02	R 4	α −79 40·5	−79 37·4		
				β −79 34·4			
16.	−65 49	202 02	R 6	α −79 36·2			
				β −79 42·9	−79 39·6	−79 39·5	
16.	−65 49	202 02	R 7	α −79 41·8	−79 41·4		
				β −79 41·0			

Observations of the Inclination, with Needles whose Poles were reversed, made at the Magnetic Observatory at Port Louis, in the Falkland Islands, April to August 1842.

Date.	Hour.	Needle.	Poles. α direct. β reversed.	Mean.	Remarks.
1842.	h m			° ′	
April 12.	1 30 P.M.	R 4	α −52 33·5	−52 25·1	Needles belonging to H.M.S. Erebus.
			β −52 16·7		
12.	3 30 P.M.	R 6	α −52 26·0	−52 29·0	
			β −52 32·0		
12.	3 30 P.M.	R 7	α −52 30·8	−52 30·8	
			β −52 30·9		
15.	8 20 A.M.	R 4	α −52 36·8	−52 26·6	
			β −52 16·3		
15.	3 10 P.M.	R 4	α −52 39·9	−52 26·2	
			β −52 12·4		
19.	8 00 A.M.	R 4	α −52 36·9	−52 27·3	
			β −52 17·8		
19.	3 30 P.M.	R 4	α −52 35·8	−52 26·3	
			β −52 16·2		
22.	8 00 A.M.	R 4	α −52 36·3	−52 26·5	
			β −52 16·8		
22.	3 30 P.M.	R 4	α −52 36·8	−52 26·1	
			β −52 15·3		
26.	8 00 A.M.	R 4	α −52 35·9	−52 23·1	
			β −52 10·3		
26.	3 30 P.M.	R 4	α −52 36·0	−52 22·3	
			β −52 08·7		
29.	8 00 A.M.	R 4	α −52 38·3	−52 28·6	
			β −52 18·8		
May 3.	8 00 A.M.	R 4	α −52 35·8	−52 21·1	
			β −52 06·4		
3.	3 30 P.M.	R 4	α −52 36·8	−52 26·8	
			β −52 16·9		
6.	8 00 A.M.	R 4	α −52 36·3	−52 26·7	
			β −52 17·1		
6.	3 30 P.M.	R 4	α −52 37·3	−52 26·1	
			β −52 14·9		

Observations of Inclination. (Continued.)

Date.	Hour.	Needle.	Poles. α direct. β reversed.	Mean.	Remarks.
1842.	h m		° ′	° ′	
May 10.	10 30 A.M.	R 4	α −52 31·2 β −52 25·2	−52 28·2	
10.	3 00 P.M.	R 4	α −52 24·3 β −52 30·6	−52 27·5	
13.	8 00 A.M.	R 4	α −52 36·7 β −52 14·5	−52 25·6	
13.	3 30 P.M.	R 4	α −52 37·0 β −52 13·5	−52 25·3	
17.	8 00 A.M.	R 4	α −52 35·6 β −52 15·3	−52 25·5	
17.	3 30 P.M.	R 4	α −52 33·4 β −52 17·7	−52 25·5	
20.	8 00 A.M.	R 4	α −52 36·8 β −52 13·2	−52 25·0	
20.	3 30 P.M.	R 4	α −52 34·3 β −52 13·0	−52 23·7	
24.	8 00 A.M.	R 4	α −52 36·5 β −52 18·6	−52 27·7	
24.	3 30 P.M.	R 4	α −52 37·6 β −52 17·7	−52 27·7	
27.	8 00 A.M.	R 4	α −52 23·5 β −52 12·5	−52 23·0	
27.	3 30 P.M.	R 4	α −52 32·8 β −52 14·0	−52 23·4	
June 1.	8 00 A.M.	R 4	α −52 37·1 β −52 16·0	−52 26·5	
1.	3 30 P.M.	R 4	α −52 35·3 β −52 16·2	−52 25·7	
4.	8 00 A.M.	R 4	α −52 35·4 β −52 17·7	−52 26·5	Needles belonging to H.M.S. Erebus.
4.	3 30 P.M.	R 4	α −52 36·3 β −52 16·9	−52 26·6	
7.	8 00 A.M.	R 4	α −52 36·4 β −52 15·4	−52 25·9	
7.	8 00 A.M.	R 4	α −52 29·0 β −52 13·7	−52 26·4	
10.	8 00 A.M.	R 4	α −52 38·4 β −52 16·4	−52 27·4	
10.	3 30 P.M.	R 4	α −52 35·9 β −52 17·6	−52 26·8	
14.	8 00 A.M.	R 4	α −52 35·8 β −52 16·2	−52 26·0	
14.	3 30 P.M.	R 4	α −52 41·3 β −52 13·2	−52 27·3	
17.	8 00 A.M.	R 4	α −52 34·8 β −52 14·7	−52 24·8	
17.	10 00 A.M.	R 6	α −52 20·4 β −52 28·0	−52 24·2	
17.	11 00 A.M.	R 7	α −52 32·1 β −52 23·4	−52 27·8	
17.	3 30 P.M.	R 4	α −52 34·0 β −52 13·6	−52 23·8	
21.	8 00 A.M.	R 4	α −52 29·9 β −52 18·6	−52 24·2	
21.	3 30 P.M.	R 4	α −52 29·7 β −52 19·9	−52 24·8	

Observations of Inclination. (Continued.)

Date.	Hour.	Needle.	Poles. α direct. β reversed.	Mean.	Remarks.
1842.	h m			° ′	
June 28.	8 00 A.M.	R 4	α −52 28·8	−52 21·5	
			β −52 14·1		
July 1.	3 30 P.M.	R 4	α −52 37·7	−52 20·7	
			β −52 03·6		
5.	8 00 A.M.	R 4	α −52 28·7	−52 21·5	
			β −52 14·3		
8.	3 30 P.M.	R 4	α −52 35·4	−52 23·5	
			β −52 11·5		
12.	8 00 A.M.	R 4	α −52 34·1	−52 23·0	
			β −52 11·9		
15.	3 30 P.M.	R 4	α −52 35·6	−52 22·7	
			β −52 09·7		
19.	8 00 A.M.	R 4	α −52 32·8	−52 22·2	
			β −52 11·6		
22.	3 30 P.M.	R 4	α −52 31·8	−52 23·3	
			β −52 14·8		
August 2.	8 00 A.M.	R 4	α −52 32·6	−52 24·3	Needles belonging to H.M.S. Erebus.
			β −52 16·1		
9.	8 00 A.M.	R 4	α −52 33·4	−52 22·6	
			β −52 11·9		
12.	3 30 P.M.	R 4	α −52 32·7	−52 23·2	
			β −52 13·8		
16.	8 00 A.M.	R 4	α −52 29·9	−52 20·0	
			β −52 10·1		
19.	3 30 P.M.	R 4	α −52 38·4	−52 25·2	
			β −52 11·9		
23.	8 00 A.M.	R 4	α −52 10·0	−52 22·0	
			β −52 34·0		
23.	9 00 A.M.	R 6	α −52 25·7	−52 22·5	
			β −52 19·3		
23.	10 00 A.M.	R 7	α −52 30·9	−52 24·2	
			β −52 17·5		
April 15.	8 00 A.M.	C 1	α −52 47·0	−52 34·3	
			β −52 21·7		
15.	3 00 P.M.	C 1	α −52 46·1	−52 35·5	
			β −52 24·9		
19.	8 45 A.M.	C 1	α −52 43·3	−52 31·8	
			β −52 20·2		
19.	3 45 P.M.	C 1	α −52 42·8	−52 32·2	
			β −52 21·6		
June 15.	8 00 A.M.	C 1	α −52 40·4	−52 32·4	
			β −52 24·4		
15.	9 00 A.M.	C 2	α −52 37·8	−52 29·4	
			β −52 20·9		
15.	3 00 A.M.	C 1	α −52 39·9	−52 31·7	
			β −52 23·4		
15.	3 40 A.M.	C 2	α −52 35·4	−52 29·3	Needles belonging to H.M.S. Terror.
			β −52 23·2		
July 26.	8 40 A.M.	C 1	α −52 44·9	−52 34·2	
			β −52 23·5		
26.	10 30 A.M.	C 2	α −52 38·6	−52 26·9	
			β −52 15·3		
August 17.	10 00 A.M.	C 1	α −52 50·4	−52 35·7	
			β −52 21·0		
17.	10 30 A.M.	C 2	α −52 36·2	−52 25·1	
			β −52 14·1		
23.	9 30 A.M.	C 1	α −52 39·9	−52 32·4	
			β −52 24·9		
23.	11 00 A.M.	C 2	α −52 33·8	−52 26·5	
23.	11 40 A.M.		β −52 19·2		
				−52 26·2	General Mean.

From these observations we have the true inclination at these six stations as follows :—

On ice, lat. −65° 49′. Long. 202° 02′ . .	79° 39′·5
On ice, lat. −63 23. Long. 210 02 . .	77 23·3
Hobarton	70 40·7
Sydney	62 49·1
New Zealand	59 31·9
Falkland Islands	52 26·2

The observations with R. F. 5, at the same stations, and at the same spots on shore, or on the ice, gave as follows :—

	On Ice. Lat. −65° 49′. Long. 202° 02′.	On Ice. Lat. −63° 23′. Long. 210° 02′.	Hobarton.	Sydney.	New Zealand.	Falkland Islands.
Face East	−79° 35′·6	−77° 15′·5	−70° 26′·4	−62° 46′·3	−59° 29′·8	−52° 32′·9
Face West	−80 39·2	−78 20·3	−71 20·3	−63 44·3	−60 27·9	−53 34·7
Mean	−80 07·4	−77 47·9	−70 53·4	−63 15·3	−59 58·8	−53 03·8

We have thus the following index corrections :—

Face East	− 3′·8	− 7′·8	−14′·3	− 2′·8	− 2′·1	+ 6′·7
Face West	+59·7	+57·0	+39·6	+55·2	+56·0	+68·5
Mean correction	+27 9	+24·6	+12·7	+26·2	+26·9	+37·6

and the difference of the results with the face east and face west as follows :—

63′·6	64′·8	53′·9	58′·0	58′·1	61′·8

From the signs and numerical values of the corrections of the *mean results* with R. F. 5, we may infer that the axis of rotation in this needle deviated from the centre of gravity in the longitudinal direction, so as to cause the south end of the needle slightly to preponderate. From the differences of the results with the face east and face west, it appears that there was also a small deviation in the axis of rotation from the centre of gravity in the perpendicular direction. In the results with the face east, these two sources of error partially counteracted each other, so that the index correction with the face east amounted at no time to more than a very few minutes.

The corrections which have been applied to the observations have been taken from the following table, in which the correction for −70° has been taken as −5′·8, and the change in the correction, corresponding to an increase of one degree in the south dip, as −0′·5. In forming this table the determinations on land have been allowed a greater weight than the determinations upon the ice, the latter consisting of fewer observations, and being made probably under circumstances less favourable for this particular purpose.

Table of Index corrections for R. F. 5, face East, between −52° and −85°.

Inclination.	Correction.	Inclination.	Correction.
°	′	°	′
−52	+3·2	−69	− 5·3
−53	+2·7	−70	− 5·8
−54	+2·2	−71	− 6·3
−55	+1·7	−72	− 6·8
−56	+1·2	−73	− 7·3
−57	+0·7	−74	− 7·8
−58	+0·2	−75	− 8·3
−59	−0·3	−76	− 8·8
−60	−0·8	−77	− 9·3
−61	−1·3	−78	− 9·8
−62	−1·8	−79	−10·3
−63	−2·3	−80	−10·8
−64	−2·8	−81	−11·3
−65	−3·3	−82	−11·8
−66	−3·8	−83	−12·3
−67	−4·3	−84	−12·8
−68	−4·8	−85	−13·3

Index Correction of F. C. B. *for the Observations of Inclination in the Terror.*—The observations of inclination at sea in this ship were all made with the face of the instrument towards the east, and with the marked face of the needle towards the observer. We may examine the index corrections consequently in the same manner, and by comparison with the same complete determinations as in the case of the needle of the Erebus; confining the comparison however to the land stations, because F. C. B. was not observed with at either of the ice stations.

The inclinations taken with this needle were observed both direct and with the aid of deflectors; the deflectors employed were a spare needle as "deflector N" and "deflector S"; and the magnets of the apparatus, either used separately as "magnet N," or "magnet S," or conjointly as "magnets N S." From some instrumental accident, the inclinations observed with "deflector N" were always considerably in defect of the others when the face of the circle was east; with a corresponding excess with the face west, on the few occasions on shore when the observations were made in both positions. As the observations at sea were exclusively with the face east, it has been necessary on this account to consider separately those amongst them which were taken with "deflector N," and to obtain a distinct index correction for them. We will first examine the index corrections required for the direct observations, and for those with the other deflectors.

The observations with F. C. B. on shore at the four land stations, where the com-

plete process for determining the true inclination was gone through with other needles, were as follows:—

		Hobarton.	Sydney.	New Zealand.	Falkland Islands.
Observed	Face East	−70° 17′·3	−62° 22′·4	−58° 50′·6	−51° 38′·4
	Face West	−70 44·8	−62 56·5	−60 02·8	−52 57·2
Mean		−70 31·1	−62 39·5	−59 26·7	−52 17·8
True inclination		−70 40·7	−62 49·1	−59 31·9	−52 26·3
Index correction	Face East	−23·4	−26·7	−41·3	−47·9
	Face West	+ 4·1	+ 7·4	+30·9	+30·9
	Mean	− 9·7	− 9·6	− 5·2	− 8·5
Differences face East and West		27·5	34·1	72·2	78·8

The corrections of the *mean results* with F. C. B. at the four stations accord well within the limits of observation error. On examining the differences in the results with the face east and face west, and the corrections severally required in the two positions at the four stations, it appears probable that a very slight derangement of some part of the instrument took place between the observations at Sydney and those at the Bay of Islands, which caused the partial results with the face east and face west to diverge more from each other than they had done previously, but without affecting the mean results. A note which accompanied the observations to England shows that Captain Crozier considered that some slight change had taken place in the amount of the index correction with the face east, but was unable to assign its date or its cause. In the absence of any distinct evidence in these respects,—and in consideration of the insufficiency of the means of assigning the precise amount of the change,—I have preferred the employment of an arithmetical mean of the index corrections observed at the four stations (−35′) during the whole course of the voyage. The uncertainty arising from this source cannot amount to more than a very few minutes in any portion of the voyage.

For the index correction with deflector N we have,

	Hobarton.	Sydney.	New Zealand.	Falkland Islands.
Face East	−69° 33′·5	−61° 36′·7	−57° 58′·0	−50° 54′·4
Face West	−71 25·9	−63 00·7	−60 12·3	−53 31·3
Mean	−70 29·7	−62 18·7	−59 05·1	−52 12·8
True inclination	−70 40·7	−62 49·1	−59 31·9	−52 26·3
Index correction, face East	−67·2	−72·4	−93·9	−91·9

Mean index correction, face East . . . . . −81′

Elements of Calculation of the Intensity Observations.

1. *With Weights.*—The observations of the intensity of the magnetic force, during the period now under consideration, were made in both ships with Mr. Fox's apparatus; those in the Erebus with the same circle which had been used in the previous voyage, and those in the Terror with a circle of the same size as that of the Erebus, being the property of Captain Crozier, and received by him at Van Diemen Island. The needle employed to show the angles of deflection in the Erebus, marked R. F. 5, was not the same which had been used for that purpose in the voyage of 1840–1841, namely, R. F. 4, which now in its turn was used as a deflector. The weights employed in deflecting the intensity needle were 1, 2, 3, 4, 5 and 6 grains: the angles of deflection obtained with one grain were however too small to yield results of the same satisfactory nature as those derived from the weights from two to six grains, and I have not therefore taken them into the account. The mounted needle in the Terror was marked F. C. B., a spare needle C being used as a deflector, in addition to the deflecting magnets belonging to the apparatus. The weights were 1, 1½, 2, 2½, 3 and 3½ grains.

At Hobarton we have the deflections occasioned by the constant weights on the needle of the Erebus, April 1841, as follows:—

	grs.	Deflection. ° ′ ″	Therm. °
Face East.	2	13 02·8	60
	3	19 37·2	60
	4	26 47·7	60
	5	34 23·5	60
	6	42 55·7	61

	grs.	Deflection. ° ′ ″	Therm. °
Face West.	2	13 14·5	60
	3	19 55·5	60
	4	27 02·7	58
	5	34 51·5	58
	6	43 07·3	58

and in the needle of the Terror as follows:—

	grs.	Deflection. ° ′ ″	Therm. °
Face East.	1	12 11·9	60
	1½	18 29·4	60
	2	25 13·7	60
	2½	31 43·0	60
	3	39 02·3	60
	3½	46 51·3	60

	grs.	Deflection. ° ′ ″	Therm. °
Face West.	1	11 42·0	60
	1½	17 52·6	60
	2	24 15·6	60
	2½	31 00·7	60
	3	38 42·3	60
	3½	46 06·3	60

At Sydney, in July 1841, the deflections with the same weights were—

Erebus.

	grs.	Deflection. ° ′ ″	Ther. °
Face East.	2	13 57·4	56
	3	21 13·7	55
	4	29 09·2	55
	5	37 43·3	55
	6	46 51·7	55

	grs.	Deflection. ° ′ ″	Ther. °
Face West.	2	14 32·6	64
	3	21 51·4	63
	4	29 32·1	64
	5	37 38·9	63
	6	47 32·4	63

Terror.

	grs.	Deflection. ° ′ ″	Ther. °
Face East.	1	13 08·8	60
	1½	20 02·0	60
	2	27 00·7	60
	2½	34 25·2	60
	3	42 06·9	60
	3½	51 13·5	60

	grs.	Deflection. ° ′ ″	Ther. °
Face West.	1	12 44·1	60
	1½	19 03·3	60
	2	26 01·2	60
	2½	33 17·7	60
	3	41 35·2	60
	3½	51 02·1	60

Taking 1·82 as the provisional value of the intensity at Hobarton (Phil. Trans. 1843, Part II. p. 186)*, we have its value at Sydney, by the needles of the two ships, as follows:—

EREBUS.

grs.	Face East.	Face West.
2	1·703	1·662
3	1·687	1·667
4	1·683	1·680
5	1·680	1·704
6	1·698	1·688
	1·690	1·680
	1·685	

TERROR.

grs.	Face East.	Face West.
1	1·691	1·674
1½	1·685	1·712
2	1·708	1·705
2½	1·692	1·709
3	1·709	1·715
3½	1·703	1·687
	1·698	1·700
	1·699	

At the Bay of Islands in New Zealand, in August and October 1841, the deflections were as follows:—

EREBUS.

August.

	grs.	Face East. Deflection.	Face East. Ther.	Face West. Deflection.	Face West. Ther.
		° ′	°	° ′	°
	2	14 59·3	59	15 23·3	60
	3	22 47·5	59	23 17·9	59
	4	30 55·0	59	30 26·9	59
	5	40 10·5	58	40 52·0	60
	6	50 38·1	58	51 26·0	61

October.

		Face East. Deflection.	Face East. Ther.	Face West. Deflection.	Face West. Ther.
		° ′	°	° ′	°
	2	14 43·2	68	15 11·1	64
	3	22 45·0	70	23 17·2	64
	4	30 30·6	70	31 29·2	65
	5	39 59·3	70	40 51·0	65
	6	50 35·0	71	51 38·7	65

TERROR.

August.

	grs.	Face East. Deflection.	Face East. Ther.	Face West. Deflection.	Face West. Ther.
		° ′	°	° ′	°
	1	14 03·2	59	13 24·3	59
	1½	21 17·9	59	20 30·5	59
	2	28 22·1	59	27 46·9	59
	2½	36 50·7	59	35 43·0	59
	3	44 58·3	59	44 38·7	59
	3½	55 09·9	59	55 23·7	59

October.

		Face East. Deflection.	Face East. Ther.	Face West. Deflection.	Face West. Ther.
		° ′	°	° ′	°
	1	13 51·7	64	13 26·8	64
	1½	20 53·0	64	20 16·4	64
	2	28 22·4	64	27 38·8	64
	2½	37 05·6	64	35 45·1	64
	3	45 02·2	64	44 47·7	64
	3½	55 19·1	64	55 26·4	64

whence we have the intensity at the Bay of Islands, by the needles of the two ships, as follows:—

* 1·82 + e being the true value, in which e is a small correction to be determined hereafter, applicable to the whole series of observations depending on Hobarton as a primary station.

Erebus.

grs.	August. Face East.	August. Face West.	October. Face East.	October. Face West.
2	1·590	1·571	1·620	1·593
3	1·578	1·568	1·583	1·570
4	1·597	1·633	1·619	1·586
5	1·594	1·590	1·603	1·591
6	1·604	1·591	1·608	1·588
	1·593	1·591	1·607	1·586
	1·592		1·596	
	1·594			

Terror.

grs.	August. Face East.	August. Face West.	October. Face East.	October. Face West.
1	1·584	1·592	1·606	1·588
1½	1·601	1·595	1·620	1·616
2	1·633	1·605	1·633	1·613
2½	1·596	1·607	1 587	1·606
3	1·622	1·619	1·621	1·616
3½	1·618	1·594	1·616	1·594
	1·609	1·602	1·614	1·605
	1·605		1·609	
	1·607			

At Port Louis in the Falkland Islands, in July and August 1842, the deflections were—

Erebus.

	grs.	April. Deflection.	April. Ther.		grs.	April. Deflection.	April. Ther.
Face East.	2	18 31·1	45	Face West.	18	50·4	42
	3	27 42·7	45		28	30·0	42
	4	37 58·5	43		38	51·0	41
	5	48 55·9	43		51	27·9	41
	6	66 49·8	43		68	40·3	41

	grs.	August. Deflection.	August. Ther.		grs.	August. Deflection.	August. Ther.
Face East.	1	17 57·1	37	Face West.	18	32·9	39
	2	27 43·3	37		28	26·6	40
	3	37 40·4	37		39	05·3	40
	4	49 31·4	38		51	19·2	40
	5	67 23·4	38		69	35·7	40

Terror.

	grs.	April. Deflection.	April. Ther.		grs.	April. Deflection.	April. Ther.
Face East.	1	16 56·5	43	Face West.	16	14·1	43
	1½	25 36·6	43		24	36·9	43
	2	34 47·2	43		33	44·9	43
	2½	45 34·1	43		44	31·3	43
	3	57 39·1	43		58	17·8	43

	grs.	July. Deflection.	July. Ther.		grs.	July. Deflection.	July. Ther.
Face East.	16	51·2	41	Face West.	16	26·1	41
	25	34·3	41		24	27·9	41
	34	47·8	41		33	49·5	41
	45	29·7	41		44	17·1	41
	57	48·7	41		58	19·5	41

	grs.	August. Deflection.	August. Ther.		grs.	August. Deflection.	August. Ther.
Face East.	17	00·4	38	Face West.	16	15·4	38
	25	37·3	38		24	30·1	38
	34	24·4	38		33	57·8	38
	45	20·1	38		44	32·3	38
	57	43·6	38		57	35·7	38

whence we have the intensity at Port Louis, by the needles of the two ships, as follows:—

Erebus.

grs.	April. Face East.	April. Face West.	August. Face East.	August. Face West.
2	1·291	1·288	1·330	1·306
3	1·311	1·296	1·310	1·299
4	1·331	1·315	1·339	1·309
5	1·361	1·326	1·347	1·329
6	1·345	1·332	1·339	1·324
	1·328	1·311	1·333	1·313
	1·320		1·323	
	1·322			

Terror.

grs.	April. Face East.	April. Face West.	July. Face East.	July. Face West.	August. Face East.	August. Face West.
1	1·316	1·316	1·323	1·301	1·311	1·315
1½	1·331	1·338	1·333	1·345	1·331	1·344
2	1·356	1·342	1·355	1·339	1·369	1·335
2½	1·336	1·334	1·338	1·339	1·341	1·333
3	1·353	1·333	1·350	1·333	1·352	1·344
	1·338	1·332	1·340	1·331	1·341	1·334
	1·335		1·336		1·337	
			1·336			

Besides the four land stations at which the intensities shown by the needles of the two ships have been thus compared, we have also one ice station in lat. −65° 47′, long. 202° 08′, at which similar comparisons may be instituted. The deflections and intensities were as follows:—

Face East.	Erebus. grs.	Deflection. ° ′	Ther. °	Intensity.
	2	12 13·0	50	1·940
	3	18 32·4	54	1·921
	4	24 49·3	54	1·952
	5	32 02·4	54	1·936
	6	39 31·4	55	1·946
				1·939

Face East.	Terror. grs.	Deflection. ° ′	Ther. °	Intensity.
	1	11 25·4	53	1·940
	1½	17 08·3	53	1·957
	2	23 02·9	53	1·979
	2½	29 16·2	53	1·955
	3	36 17·4	53	1·935
	3½	43 23·5	53	1·932
				1·950

Collecting these several results in one view, we have as follows:—

	Erebus.	Terror.	Difference. (Erebus in defect.)
Intensity at Hobarton	1·82	1·82	
Intensity at Sydney	1·685	1·699	·014 or 8 parts in 1000
Intensity at the Bay of Islands	1·594	1·607	·013 or 8 parts in 1000
Intensity on ice, lat. −65° 49′, long. 202° 02′	1·939	1·950	·011 or 7 parts in 1000
Intensity at Port Louis, Falkland Islands	1·322	1·336	·014 or 10 parts in 1000

The difference between the results given by the needles of the two ships, though small, is so consistently shown at all the stations during the voyage, that we cannot hesitate to attribute it to the occurrence of a change of corresponding amount in the magnetism of one needle or the other, between the observations at Hobarton in April 1841, and those at Sydney in July of the same year. If we further compare the intensities observed at sea by the two ships on the passage from Hobarton to Sydney, we find that a similar difference prevails in them; and we are therefore led to the conclusion, either that the needle of the Terror gained, or that the needle of the Erebus lost, a very small portion of magnetism, in the period between the observations at Hobarton in April 1841, and the departure of the Expedition from that port in the following July. Now experience has shown that a loss of magnetism is no unfrequent occurrence, whilst a gain is extremely rare, happening only, as far as we know, from such an accident as the contact of a needle with a more powerful magnet than itself. We may therefore conclude with great probability that the needle of the Erebus sustained a small loss of magnetism between April and July 1841, antecedent to all the observations of the voyage, causing the intensities derived with it, *when computed in reference to the angles of deflection observed at Hobarton in April* 1841, to require to be increased about one hundredth part, or more precisely 8 parts in 1000, in order

to bring them into strict relation with 1·82, taken as the value of the force at Hobarton. This correction being applied, all the intensities observed throughout the voyage by the two ships are in accordance (subject only to errors of observation), forming a consistent series of relative determinations, resting on 1·82 and 1·336, assumed provisionally as the values of the intensity at Hobarton and Port Louis, the commencing and concluding stations of the series. The correction is made in the Table which exhibits the intensities observed on board the two ships, and the geographical positions to which they belong; it is also made in the results inserted in the Map. The correctness of the values assumed at the base stations, 1·82 at Hobarton and 1·336 at Port Louis, remains to be proved by absolute determinations which have yet to be made at those two stations. The absolute intensities observed by the Expedition itself, with the instruments and according to the method prescribed in the instructions of the Royal Society, certainly have not the necessary precision. In the preceding Number of these Contributions are stated the results of five determinations which were obtained by Captain Ross at Hobarton in 1840 and 1841, with the 15-inch magnets of his observatory magnetometers; and of twenty-two determinations obtained by Lieut. Kay at the magnetic observatory at that station, with similar instruments, in 1841 and 1842. Captain Ross's mean result was 4·573, the partial results varying from 4·491 to 4·626. Lieut. Kay's mean result in 1841 was 4·553, the partial results (ten in number) varying from 4·509 to 4·601; and in 1842 4·513, the partial results (twelve in number) varying from 4·443 to 4·568. In 1843 Lieut. Kay received the *auxiliary apparatus* supplied in compliance with the *revised instructions* of the Royal Society, published in 1842. The magnets of this apparatus were 12 inches in length. The following Table exhibits the results obtained with this instrument in thirteen determinations made with it, between June 23rd and July 1st, 1843. Each determination is deduced from two series of observations of deflection; in the first six instances the distances were 4·505 and 6·005 feet; in the remainder, 4·0 and 5·3 feet. The moment of inertia of the deflecting magnet was computed from the length, breadth and mass of the bar.

June 23.	4·509	June 27.	4·557
24.	4·515	28.	4·505
24.	4·528	28.	4·504
26.	4·510	29.	4·549
26.	4·523	29.	4·527
27.	4·583	30.	4·466
		July 1.	4·479

Mean of the 13 determinations 4·520

Here also it is obvious, from the discrepancy of the partial results, that the angles of deflection afforded by these magnets at the prescribed distances, viz. the least distance being not less than four times the length of the bar, were still too small; and that before any final conclusion be arrived at, it is desirable that we should await the

results which will be obtained with the smaller apparatus described by Lieut. RIDDELL in his "Magnetical Instructions for the use of Portable Instruments," &c. In this apparatus the suspended and deflecting magnets are respectively 3·0 and 3·67 inches in length. Meanwhile we may derive, as a provisional value, the arithmetical mean of the four mean results already stated; allowing to each an equal weight, we have,

Ross, in 1840–1841,	15-inch magnets,	4·573	} Mean	4·54
KAY, in 1841,	do. do.	4·553		
KAY, in 1842,	do. do.	4·513		
KAY, in 1843,	12-inch magnets,	4·520		

which, with the other necessary data stated in the preceding Number of these Contributions, would give the value of the total intensity at Hobarton 1·81 to 1·372 in London*.

* Since these pages were written I have received the details of the observations of ten distinct determinations of the absolute horizontal intensity at the magnetic observatory at Hobarton, made in August 1843 with deflecting and suspended magnets respectively of 9·18 inches and 7·50 inches in length. The deflecting distances were the same throughout, being 3·2893 and 4·3393 feet. The calculation of these observations not having been yet received from Lieut. KAY, the results have been computed by Lieut. RIDDELL, R.A., F.R.S., so far as the materials hitherto furnished permit. They give the value of X′;—being the absolute horizontal intensity (X), uncorrected for the difference in the magnetic moment of the deflecting bar produced by the earth's inducing action in the different positions in which the bar is placed in the experiments of deflection and in those of vibration; viz. 1° perpendicular to the magnetic meridian, and 2° in the plane of the meridian. We owe the suggestion of a correction due to this cause to Dr. LAMONT: but the necessary data for computing it, for the particular bars employed by Lieut. KAY on this, or on the former occasions, have not yet been received. Observations made at the Cape of Good Hope and at Woolwich, with similar bars, have given results which show that the correction may possibly prove to be of nearly the same amount for the larger and smaller bars, in which case the relative values will be but little affected, and we may estimate that the value of X at Hobarton will be about 0·02 less than X′. In the expression which has been employed in these Contributions for the absolute horizontal intensity (1·82+e at Hobarton and 3·72+e at London, e being a small quantity to be supplied hereafter), the correction here referred to will form a portion of e. The following Table exhibits the abstract of the observations made in August 1843 with 9·18 and 7·50 inch bars.

Gottingen Mean Time.	Deflecting Magnet.			Values of X′.	Bifilar Magnetometer. k=000229. q=000224.	
	No.	Value of m′.	Temperature during deflection.		Reading.	Temp.
1843. Aug. d h			°			°
20 19·0	9·18 inch.	6·256	54·6	4·5052	165·1	52·0
21 11·5	9·18 inch.	·259	49·6	·5034	168·6	49·1
21 16·5	9·18 inch.	·251	51·9	·5043	165·3	49·1
21 19·5	9·18 inch	·261	53·7	·4993	168·3	50·0
22 11·0	9·18 inch.	·227	48·0	·5177	165·4	49·3
22 19·5	9·18 inch.	·243	54·5	·5025	164·6	50·7
23 10·8	9·18 inch.	·259	50·7	·4884	161·0	51·2
23 18·1	9·18 inch.	·244	52·4	·5005	162·2	51·0
23 19·1	9·18 inch.	·240	52·0	·4982	163·9	51·3
25 11·4	9·18 inch.	·252	49·4	·4953	165·3	51·5
		6·249	51·7	4·5015	165·0	50·5

The mean value of the results, 4·501, is considerably different from the mean deduced in the text from all

At the Falkland Islands there were two determinations of the absolute horizontal intensity made by Captain Ross at the Magnetic Observatory at Port Louis, one in September 1842, being 6·87, and a second in November of the same year, being 6·32. They were both made with 15-inch magnets; the angles of deflection were observed at four distances, but amounted only to 56′·8, 31′·9, 21′·4, and 12′·9 in the first experiment, and to 1° 49′·9, 1° 01′·6, 41′·5, and 25′·1 in the second experiment.

These values of the horizontal intensity would give that of the total intensity at Port Louis respectively 1·609 and 1·367. It is obvious that we can draw no conclusion whatsoever from these numbers, and that we must wait for the confirmation or correction of the value given by the needles of Mr. Fox's instrument, until absolute determinations can be procured with instruments capable of affording more satisfactory results. Steps have been taken to obtain such determinations at the Falkland Islands from Captain Sullivan, R.N., and at Sydney and New Zealand from the Surveying Expedition under Captain Blackwood, R.N.; when these arrive, we may learn whether any and what final correction will require to be applied to the intensities now provisionally deduced from the observations with Mr. Fox's needles, in the Erebus and Terror. We may expect to receive these determinations before the time when the results now presented to the Royal Society will have to be combined with those of the preceding and succeeding years, in a general calculation of the magnetic lines in the southern hemisphere.

2. *With Deflectors.*—In the Erebus, the spare needle R. F. 4 was employed,—as "deflector S," with its south pole opposite to the division of the circle which the south pole of the mounted needle had previously indicated as the dip;—and as "deflector N," with its north pole similarly applied to the opposite division of the circle. The angles of deflection varied in different localities during the voyage, in round numbers as follows:—Deflect. S from 52° to 71°; and deflect. N from 49° to 67°. For obtaining the equivalent weights to the deflecting force of the deflectors at these angles, we have the comparative observations with deflectors and weights at Hobarton, Sydney, New Zealand, the Falkland Islands, and on the ice in lat. −65° 47′, long. 202° 08′. The angles of deflection caused by the weights have been already stated;

the preceding observations; yet from the improvement which it is natural to suppose practice must have made in the observers, and from the reduced discrepancies of the partial results with the smaller bars, the mean of the ten results in August 1843 would seem entitled to a preference over the earlier and more numerous results. Judging by what has been done at Woolwich with the 2·45 and 3 inch magnets, and at the Cape of Good Hope with 3·0 and 3·67 inch, we may expect with them a still further and considerable reduction in the discrepancies of the partial results; but it would not be safe, with the comparisons which we have now before us, to feel full confidence that there will be no apparently constant or systematic difference between the results of the larger and smaller bars. Reviewing the whole subject, we can as yet, therefore, only consider ourselves as being in progress towards such accuracy in determining the ratio of the intensity at different places by the absolute method, as shall be superior to that with which it was previously obtained by the employment of well-selected needles in relative determinations.

those by the deflectors, with the equivalent weights deduced from the comparison, are collected in the following Table.

Station.	Date.	Intensity deduced by weights.	Angles of deflection by		Equivalent weights.	
			Def. S.	Def. N.	Def. S.	Def. N.
					grs.	grs.
Hobarton	April 1841	1·82	56° 28′·6	53° 02′·6	7·39	7·08
Sydney	July 1841	1·685	59 10·2	55 37·0	7·05	6·77
New Zealand....	Aug. and Oct. 1841	1·594	61 46·9	57 59·0	6·84	6·58
On ice	January 1842	1·939	54 03·1	50 35·0	7·65	7·30
Falkland Islands .	April and Aug. 1842	1·322	71 11·8	67 10·3	6·10	5·93

By projecting these angles and weights, and proceeding in the manner described in the Third Number of these Contributions*, the values of w' in the following Table were obtained for each deflector, corresponding to each angle of deflection v'; and employing these values of w', the intensities I′ entered in the general table of observations have been computed by the formula

$$I' = \frac{1{\cdot}82 \sin 56^\circ 28'{\cdot}6}{7{\cdot}39} \cdot w' \operatorname{cosec} v' = 2{\cdot}053 w' \operatorname{cosec} v'.$$

Besides the observations with the spare needle R. F. 4, employed as a deflector, angles of deflection were occasionally observed with the magnets N and S, belonging to the apparatus of the Erebus, used conjointly; their magnetism, however, was so much inferior to that of R. F. 4, that, even when both were used together, their joint effect was less than the half of either pole of R. F. 4; their results would consequently be much inferior in precision to those of R. F. 4, and I have not therefore employed them.

Def. S.						Def. N.					
v'.	w'.	v'.	w'.	v'.	w'.	v'.	w'.	v'.	w'.	v'.	w'.
°	grs.	°	grs.	°	grs.	°	grs.	°	grs.	°	grs.
52	7·87	59	7·11	66	6·47	49	7·49	56	6·76	63	6·19
53	7·76	60	7·01	67	6·39	50	7·38	57	6·67	64	6·13
54	7·65	61	6·91	68	6·31	51	7·27	58	6·57	65	6·06
55	7·54	62	6·82	69	6·24	52	7·17	59	6·48	66	6·00
56	7·43	63	6·73	70	6·17	53	7·07	60	6·40	67	5·94
57	7·32	64	6·64	71	6·10	54	6·97	61	6·33		
58	7·21	65	6·55	72	6·03	55	6·86	62	6·26		

In the Terror, the spare needle marked C was employed both as "deflector N" and "deflector S." The magnets belonging to the apparatus were also used, N separately, and N and S conjointly. Observations were also occasionally made with magnet S, but its magnetism was so feeble, and the deflections obtained with it consequently so small in comparison with the others, that the results are not entitled to the same confidence, and have not therefore been taken into the account. The equivalent weights have been obtained, as in the Erebus, from the comparative observations with weights and deflectors at Hobarton, Sydney, New Zealand, the Falkland

* Philosophical Transactions, 1842, Art. II.

Islands, and on the ice in lat. −65° 47′, long. 202° 08′. I have also, in the case of the Terror, availed myself of a comparison of the weights and deflectors made on the 3rd, 4th and 5th of December 1841, at sea, when the weather was extremely favourable, and the ship did not materially change her position. From the observations on these days we have as follows:—

December 1841.	Intensity deduced by weights.	Angles of deflection by			
		Def. N.	Def. S.	Mag. N.	Mag. N S.
3 A.M.	1·783	36° 55′·9	34° 06′·7	30° 44′·1	40° 52′·8
3 P.M.	1·778	36 51·6	34 06·3	30 46·1	40 45·8
4	1·773	36 { 41·8 / 44·7	34 22·0	30 48·7	40 56·3
5	1·779	36 18·3	34 29·4	30 46·1	40 54·9
Mean ..	1·778	36 42·5	34 16·0	30 46·2	40 52·5

The several comparisons from which the equivalent weights are derived, together with the weights so derived, are collected in the following Table.

Station.	Date.	Intensity deduced by weights.	Angles of deflections by				Equivalent weights.			
			Deflector N.	Deflector S.	Magnet N.	Magnets N S.	Deflector N.	Deflector S.	Magnet N.	Magnets N S.
							grs.	grs.	grs.	grs.
Hobarton	April 1841 ..	1·820	36° 00′·6	33° 23′·0	30° 14′·0	40° 05′·5	2·793	2·613	2·391	3·059
Sydney	July 1841 ..	1·699	38 05·9	35 15·7	31 47·2	41 45·3	2·736	2·560	2·336	2·953
New Zealand ..	Aug. and Oct. 1841	1·608	39 36·8	36 57·8	32 50·8	42 58·4	2·675	2·525	2·276	2·861
At Sea	Dec. 3, 4 and 5. 1841	1·778	36 42·5	34 16·0	30 46·2	40 52·5	2·773	2·613	2·374	3·036
On Ice	Jan. 16, 1842	1·949	33 47·6	31 16·1	28 52·7	38 45·7	2·829	2·640	2·456	3·184
Falkland Islands	April, July and Aug. 1842	1·336	44 38·2	41 57·1	35 59·0	46 14·0	2·442	2·324	2·042	2·510

The equivalent weights for each deflector, and for each half degree of deflection, have been obtained in the manner already described, for the angles of deflection and equivalent weights in the preceding Table, and are subjoined; by their aid the intensities I′ entered in the general table of observations have been computed by the formula

$$I' = \cdot 3832 w' \operatorname{cosec} v'.$$

Def. N.				Def. S.				Magnet N.				Magnets NS.			
v'.	w'.	v'.	w'.	v'.	w'.	v'.	w'.	v'.	w'.	v'.	w'.	v'.	w'.	v'.	w'.
° ′	grs.	° ′	grs.	° ′	grs.	° ′	grs.	° ′	grs.	° ′	grs.	° ′	grs.	° ′	grs.
33 00	2·840	39 30	2·682	31 00	2·644	37 30	2·504	28 00	2·482	34 30	2·166	37 00	3·268	43 30	2·816
33 30	2·834	40 00	2·660	31 30	2·639	38 00	2·485	28 30	2·464	35 00	2·126	37 30	3·240	44 00	2·766
34 00	2·826	40 30	2·638	32 00	2·634	38 30	2·464	29 00	2·446	35 30	2·085	38 00	3·210	44 30	2·714
34 30	2·817	41 00	2·615	32 30	2·627	39 00	2·444	29 30	2·426	36 00	2·040	38 30	3·180	45 00	2·660
35 00	2·809	41 30	2·593	33 00	2·619	39 30	2·423	30 00	2·406			39 00	3·148	45 30	2·604
35 30	2·800	42 00	2·571	33 30	2·611	40 00	2·403	30 30	2·387			39 30	3·114	46 00	2·544
36 00	2·790	42 30	2·548	34 00	2·602	40 30	2·382	31 00	2·367			40 00	3·081	46 30	2·460
36 30	2·777	43 00	2·524	34 30	2·591	41 00	2·361	31 30	2·346			40 30	3·049		
37 00	2·765	43 30	2·488	35 00	2·580	41 30	2·341	32 00	2·323			41 00	3·016		
37 30	2·753	44 00	2·473	35 30	2·567	42 00	2·321	32 30	2·297			41 30	2·981		
38 00	2·738	44 30	2·448	36 00	2·554			33 00	2·268			42 00	2·944		
38 30	2·721	45 00	2·423	36 30	2·538			33 30	2·236			42 30	2·905		
39 00	2·702			37 00	2·523			34 00	2·203			43 00	2·863		

General Remarks.—If we take a general view of the magnetic DECLINATION in the southern hemisphere, particularly in the best-known portion of it, comprised between the tropics and the Antarctic Circle, we find that the phenomena present the same obvious and decided features of a duplicate system as do those of the northern hemisphere. If, following any of the geographical parallels, we carry our attention round the hemisphere, we find it divided into four spaces, in which opposite characteristics in regard to the direction of the needle alternately present themselves. In two of the spaces the change in the pointing of the needle, as the space is traversed in the direction of the parallel, is continuous and progressive towards the west, and in the other two continuous and progressive towards the east. If, for example, commencing with the meridian of 30° E. or thereabouts, we trace the parallel of −45° round the hemisphere, always proceeding in an easterly direction till we return to the meridian at which we began, we shall find that we first pass through a space in which the direction of the north end of the needle becomes progressively more and more *easterly*, either by the decrease of westerly or increase of easterly declination; we next pass into a second space, on entering which the continuity is broken, the progressive movement of the north end of the needle towards the east is arrested, and its direction becomes now more and more *westerly* as we advance; thence we pass, successively, into a third space which has the same characteristic as the first, and into a fourth which has the same as the second.

The spaces here spoken of must be distinguished from those which are characterized by the exclusive prevalence of either east or west declination: they have a more simple and pure magnetical relation, implying the predominance within each space of one or the other of the two systems of magnetic forces which govern the direction of the needle. It may happen, or it may not happen, that in one of these spaces the direction of the needle may coincide in some point or points with the *geographical* meridian; when this occurs, the space will comprise both east and west declination; when it does not happen, the declination throughout the space will be exclusively east or exclusively west as the instance may be: but in either case, the change in the direction of the needle is always continuous and uniform in character throughout the space. It is well known that if the magnetic declination be computed on the supposition of a single central magnetic axis, there will be found two, and only two such spaces in each hemisphere. The systematic discordance which the declinations in the *northern* hemisphere presented when compared with the declinations so computed, and their agreement with the phenomena deducible from a double system of forces, led HALLEY to embrace the latter hypothesis. The declinations in the southern hemisphere present an arrangement strictly analogous to that in the northern, and conduct to the same conclusion, be that conclusion what it may.

If, with HALLEY, we view the declinations in the Southern Pacific as principally influenced by the weaker system of forces, or by that to which is also to be ascribed the high intensity of the magnetic force in the same quarter, we should be prepared

to expect that if the geographical limits of the adjacent spaces, having the characteristics referred to, were determined at different epochs, the alteration in the position of the spaces, if any, would show the existence of a secular change in the system itself; that it would indicate the direction of such change; and, if the intervals were sufficiently long in reference to the precision with which the determinations were made, the average rate of the movement of translation might also be inferred.

In this view a knowledge of the geographical position of the limiting lines, or of lines drawn so as to separate one of these spaces from the next, may have a particular value. In the part of the Pacific Ocean which is now referred to, the *separating lines*, as for distinction they may be called, coincide nearly in direction with geographical meridians, and are therefore crossed nearly at right angles by vessels pursuing a course from east to west, or from west to east. Prior to our own times, the epoch of Captain Cook's voyages is perhaps that in which the observations of the declination in the Southern Pacific may be regarded with the most confidence. The determinations of that period have been collected by M. Hansteen into a map, of which he assigns the year 1770 as the mean epoch. It is one of those published in the Atlas of the Magnetismus der Erde, and comprehends the results obtained by Byron, Carteret, Wallis, Cook in three voyages, Ekeberg also in three voyages, and Abercrombie. If in this map we draw lines separating the spaces which have the opposite magnetic characteristics referred to, and compare them with the corresponding lines which we may draw in Erman's map of the Declination in 1827–1830, published in the Magnetic Instructions of the Royal Society, we find an effect of secular change very distinctly shown in the altered position of the separating lines. These lines, A and B, are drawn in the accompanying Plate *, where the two epochs, 1770, and 1827–1830, are brought into comparison. In the map of 1827–1830, the separating lines occupy a considerably more westerly position than in the earlier map, the difference amounting to about 10° of longitude. Hence we are led to the conclusion, that the spaces in the Southern Pacific, distinguished by certain magnetic characteristics, undergo a movement of translation, of which the general direction is from east to west. This direction is the opposite to that in which the change is known to take place in the corresponding quarter in the northern hemisphere (viz. in the Siberian quarter), where the secular movement is from west to east.

We are not without earlier, though possibly it may be supposed less precise, evidence of the effect of secular change in the Southern Pacific. From Halley's chart of the variation lines for 1700, we are enabled to draw the separating line B for that epoch, when we find it to have been between the longitudes of 305° and 310°. In a still earlier map drawn by Hansteen for the year 1600 (Magnetismus der Erde, Atlas, No. 1), representing the observations of the very able and scientific navigators of that period, we find the position of the same line to have been about 333° of east longitude.

In the observations of Captain Ross's voyage, we have the most recent evidence of the progressive westerly movement of the magnetic phenomena in the Southern

* Plate XII.

Pacific. The separating lines A and B, deducible from the observations in 1842, are seen in the Plate to be in both cases considerably to the west of those derived from the observations of 1827–1830.

The whole body of evidence therefore, from the earliest observations to the latest, is consistent in showing a progressive movement to the westward of the spaces in the Southern Pacific, characterized by certain magnetic peculiarities, which in Halley's view indicated the proximity and predominance of the weaker system of forces. It is worthy of notice that the rate of progression, deduced from the changes of position shown at the several epochs, differs much less from a uniform rate than might have been anticipated from the nature of the evidence we possess, even supposing the actual rate to have been uniform in nature; whilst the magnitude of the whole change which appears to have taken place since the phenomenon became the subject of observation, in round numbers 50° of longitude in two centuries and a half, can scarcely fail to fix the attention. These are facts which, when the true physical causes of the magnetism of the globe shall occupy the earnest attention of philosophers, will probably attain an importance which at present perhaps we scarcely sufficiently estimate. But an endeavour to place distinctly before our minds facts of which the explanation must be deemed an essential condition of a satisfactory solution of this great problem, may not be without its use even at the present time. It may be also useful to call the attention of navigators to the value which may hereafter attach to determinations which may be made with instruments which are on board every ship, and in constant employ for the ordinary purposes of navigation. The position of the lines separating the spaces which have been the subject of discussion, has the advantage of being even more easily determined by observations on board ship than that of any particular declination line; in crossing them, the declination, if previously decreasing, will then begin to increase, and if previously increasing will begin to decrease; the determination is therefore independent of compass error, which is a much more prevalent source of error than is generally supposed; and if the ship's course be steady for some days together, which in the latitudes in question is very frequently the case, it is also in a great measure independent of the disturbance occasioned by the ship's iron. A very cursory inspection of the general table of the declinations observed by the Erebus and Terror suffices to show that they must have crossed the separating line (A) about the 15th of March 1842, when their latitude was about −59° and longitude 221°; and the line (B) about the 27th or 28th of the same month in latitude about −59°, and longitude 275°*.

Should the circumstance occur that one of the separating lines in the course of its progressive change of place should pass over a magnetic observatory, the epoch of its passage would be precisely determined. There is some reason for believing that

* The line A passes through the culminating points of the southerly inflexion of the declination lines, of which the present position is shown in the Declination Map at the close of this paper to be about 220° east longitude. The line B passes through the culminating points of the northerly inflexion of the declination lines about the longitude of 276°.

such an event is now taking place at the Cape of Good Hope. If we examine Erman's map of the Declination in 1827–1830, published in the magnetic instructions of the Royal Society, we find one of the separating lines in the neighbourhood of the Cape of Good Hope, and if we compare this map with those of earlier epochs, we find the position of that line progressively more and more to the east as we ascend in the order of time. Hence we should be led to expect that about this period it might be found to pass over the meridian of the Cape. The observations which have been made daily at the magnetic observatory at the Cape, since its establishment in 1841, give reason to believe that the westerly declination which had been increasing for above two centuries, attained its maximum in the year 1842 or 1843. In April 1841 the declination was 29° 05′ west, in and April 1844 29° 06′ west*. The earliest observations at the Cape with which I am acquainted, are those of Davis in 1605, and Keeling in 1609. (Purchas, Book iv. ch. 6. § 1. and Book iii. ch. 6. § 4.) According to these observations the declination in 1605 was 0° 30′ east, and in 1609 0° 12′ west†. The line of no declination probably therefore passed over the Cape about the year 1607, and in 235 years the westerly declination has increased from 0° to 29°, (omitting the odd minutes,) or at an annual average rate of 7′·4. Observations at several intermediate epochs show that the progression of this change was at least not very far from being an uniform one. If we divide the whole period into four equal parts, we should have

In the year 1607	0	0
In the year 1666	7	15 W.
In the year 1725	14	30 W.
In the year 1784	21	45 W.
In the year 1843	29	0 W.

In the appendix of Hansteen's Magnetismus der Erde, p. 24, we have the record of actual observations as follows:—

In the year 1667	7	15 W.
In the year 1724	16	27 W.
	16	18 W.
In the year 1780	22	16 W.

We may therefore conclude that the westerly declination at the Cape, which for above 200 years had increased at an average rate of about 7′·4 a year, or a degree in about eight years, has been for the last three years nearly stationary, having arrived at a maximum of 29° and a few minutes about the year 1843; and that a decreasing progression may now be expected‡. Ships passing the Cape, on a voyage to the

* The observations at the magnetic observatory at the Cape of Good Hope, preparing for the press, will show the mean declination in each month of the years referred to.

† See also, for the latter observation, Hansteen's Magnet. der Erde. Anhang. S. 146.

‡ Captain FitzRoy observed 28° 30′ in 1836; at that epoch, consequently, the maximum had not been reached. Sir Edward Belcher, in 1842, observed 29° 13′.

east, will find that the westerly variation, which increases the whole way from the Brazils to about the meridian of the Cape, begins there to diminish, and continues to diminish, passing into easterly variation increasing, for above 100 degrees of longitude east of the Cape. The separating line which now passes through the Cape divides spaces distinguished by opposite magnetic characteristics; on the west side of the Cape the north end of the needle moves to the west, and on the east side to the east, as east longitude increases.

The maps which exhibit the results of the observations in the two ships, of the Declination, Inclination and Intensity, in the voyage of 1841–1842, and the isogonic, isoclinal, and isodynamic lines traced approximately in conformity with them, are a continuation of the maps published in No. V., which embodied in a similar manner the results of the preceding voyage. The results in the Erebus are distinguished from those in the Terror by a different character, for the purpose of permitting the degree of accordance in the two series of independent determinations to be readily judged of by the eye. These maps afford the best reply to those who have expressed doubts of the success of observations of the inclination and intensity made at sea.

Magnetic lines, drawn from observations made in parts of the globe to which observation had not previously extended, are the proper test by which we may judge of the degree of approximation with which the values of the numerical elements have been obtained in a general mathematical theory of terrestrial magnetism, such as M. Gauss's. The portion of the observations of the Antarctic Expedition which has been placed before the Royal Society in No. V. and in the present number of these Contributions, permits us already to form some conclusion on this point. Plate XIII. exhibits the lines of one of the magnetic elements, i. e. the intensity, computed by M. Gauss's theory, and drawn in Plates XVIII. and XIX. of the Atlas des Erdmagnetismus, compared with the lines which are the direct results of observation.

The very imperfect resemblance between the two systems of lines is of course no impeachment of the sufficiency of the theory, with corrected numerical elements, to represent the natural phenomena in parts of the globe which observation may not have reached. The degree of approximation to which it will do this must depend upon the extent and correctness of the observation-basis from whence the numerical elements are derived, and upon the order of the magnitudes comprehended in the calculation.

The evidence which the plate affords, that the calculations in the elaborate work referred to differ so widely from the facts in the southern latitudes, shows how much observations were wanting in those latitudes for the purpose of perfecting the theory; and is an ample justification (if indeed any justification were necessary) of the exertions which the last few years have witnessed to obtain them.

Since these pages were written I have received from Mr. Archibald Smith the following note. Regarding it as a continuation of the memorandum with which he

was so obliging as to favour me, printed in the last number of these Contributions, I avail myself of this oportunity of giving it an early circulation.

"The apparent changes in the values of the constants a, b, c and d, in the Erebus and Terror (Contributions, No. V., p. 153), seem to show that those vessels had an appreciable quantity of magnetism, which was so far permanent, as to retain for a considerable time traces of the inductive force to which they had been exposed, and perhaps some strictly permanent magnetism. It seems, therefore, desirable to introduce into the expressions in the memorandum printed at p. 147 of Contribution No. V., terms which will represent such forces.

"Suppose, then, as in the memorandum, that φ represents the total magnetic force of the earth at the place of observation, θ the inclination, ζ the azimuth of the ship's head, reckoning from N. to W., and that φ', θ', ζ' represent the values of the same quantities shown by an instrument at a fixed position in the vessel, and affected by the attraction of the iron in the vessel; and let P, Q, R represent the attraction of the permanent magnetism in the vessel to the bow, to the starboard side, and vertically downwards. The fundamental equations of the former memorandum become by the introduction of these terms,

$$\varphi' \cos\theta' \cos\zeta' = \varphi\,[\mathrm{A}' \cos\theta \cos\zeta + \mathrm{B} \cos\theta \sin\zeta + \mathrm{C} \sin\theta] + \mathrm{P}$$
$$\varphi' \cos\theta' \sin\zeta' = \varphi\,[\mathrm{D} \cos\theta \cos\zeta + \mathrm{E}' \cos\theta \sin\zeta + \mathrm{F} \sin\theta] + \mathrm{Q}$$
$$\varphi' \sin\theta' = \varphi\,[\mathrm{G} \cos\theta \cos\zeta + \mathrm{H} \cos\theta \sin\zeta + \mathrm{K}' \sin\theta] + \mathrm{R}.$$

"In these equations A', B, C, D, E', F, G, H and K' are constants depending on the distribution of the soft iron in the ship, and perhaps on the temperature and other circumstances.

"If we suppose, as before, that the soft iron is symmetrically disposed, the equations (1.) (2.) and (3.) of the former memorandum become,

$$\frac{\varphi' \cos\theta' \cos\zeta'}{\mathrm{A}'\varphi \cos\theta} = \cos\zeta + a \tan\theta + \frac{\mathrm{P}}{\mathrm{A}'\varphi \cos\theta} \quad \ldots\ldots\ldots \quad (1.)$$

$$\frac{\varphi' \cos\theta' \sin\zeta'}{\mathrm{A}'\varphi \cos\theta} = b \sin\zeta + \frac{\mathrm{Q}}{\mathrm{A}'\varphi \cos\theta} \quad \ldots\ldots\ldots \quad (2.)$$

$$\frac{\varphi' \sin\theta'}{\mathrm{A}'\varphi \cos\theta} = c \cos\zeta + d \tan\theta + \frac{\mathrm{R}}{\mathrm{A}'\varphi \cos\theta} \quad \ldots\ldots\ldots \quad (3.)$$

"Let H represent the horizontal force $= \varphi \cos\theta$, H' the affected horizontal force $= \varphi' \cos\theta'$, and let $a \tan\theta + \frac{\mathrm{P}}{\mathrm{A}'\mathrm{H}} = \mathrm{L}$, $\frac{\mathrm{Q}}{\mathrm{A}'\mathrm{H}} = \mathrm{M}$, and $d \tan\theta + \frac{\mathrm{R}}{\mathrm{A}'\mathrm{H}} = \mathrm{N}$. The last equations become

$$\frac{\mathrm{H}'}{\mathrm{A}'\mathrm{H}} \cos\zeta' = \cos\zeta + \mathrm{L} \quad \ldots\ldots \quad (1\,a.)$$

$$\frac{\mathrm{H}'}{\mathrm{A}'\mathrm{H}} \sin\zeta' = b \sin\zeta + \mathrm{M} \quad \ldots\ldots \quad (2\,a.)$$

$$\frac{\mathrm{H}' \tan\theta'}{\mathrm{A}'\mathrm{H}} = c \cos\zeta + \mathrm{N} \quad \ldots\ldots \quad (3\,a.)$$

"By the introduction of the same quantities, the equations numbered from (4.) to (14.) in the former memorandum become

$$\frac{H'}{A'H} = \cos\zeta\cos\zeta' + b\sin\zeta\sin\zeta' + L\cos\zeta' + M\sin\zeta' \quad . \quad . \quad . \quad (4.)$$

$$(\cos\zeta + L)\sin\zeta' = (b\sin\zeta + M)\cos\zeta' ; \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5.)$$

and representing $\zeta - \zeta'$, or the deviation, by δ,

$$\sin\delta = L\sin\zeta' - M\cos\zeta' + (1-b)\sin\zeta\cos\zeta' \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6.)$$

$$= \frac{2}{1+b}L\sin\zeta' - \frac{2}{1+b}M\cos\zeta' + \frac{1-b}{1+b}\cdot\sin(\zeta+\zeta') \quad . \quad . \quad . \quad (7.)$$

$$\tan\zeta' = \frac{b\sin\zeta + M}{\cos\zeta + L} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (8.)$$

$$c\cos\zeta + N = (b\sin\zeta + M)\operatorname{cosec}\zeta'\tan\theta' \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (9.)$$

$$= (\cos\zeta + L)\sec\zeta'\tan\theta' \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (10.)$$

$$= \sqrt{(\cos\zeta + L)^2 + (b\sin\zeta + M)^2}\cdot\tan\theta' \quad . \quad . \quad . \quad . \quad . \quad (11.)$$

$$\tan\theta' = \frac{c}{b}\cdot\frac{\cos\zeta + \frac{1}{c}N}{\sin\zeta + \frac{1}{b}M}\sin\zeta' \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (12.)$$

$$= c\frac{\cos\zeta + \frac{1}{c}N}{\cos\zeta + L}\cdot\cos\zeta' \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (13.)$$

$$= \frac{c\cos\zeta + N}{\sqrt{(\cos\zeta + L)^2 + (b\sin\zeta + M)^2}} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (14.)$$

"Equation (7.) may also be put under the form

$$\sin\delta = \frac{2}{1+b}\sqrt{L^2+M^2}\sin(\zeta'-\mu) + \frac{1-b}{1+b}\sin(\zeta+\zeta'),$$

where

$$= \frac{2}{1+b}L\sec\mu\sin(\zeta'-\mu) + \frac{1-b}{1+b}\sin(\zeta+\zeta'),$$

in which $\tan\mu = \frac{M}{L}$, and μ represents the displacement of the line of no deviation towards the starboard side.

"By means of these equations we can determine A', L, b, M, c, N, from observations made at sea alone. The first four of these quantities furnish the corrections for the horizontal force and the declination. There is greater difficulty in obtaining the correction for the inclination. It will be observed that θ only occurs in these equations involved in the quantities L and N. If there were no permanent magnetism in the vessel, it would be necessary, in order to determine the correcting factors a and d, that observations of the inclination on shore, and corresponding observations on board, should be made in at least one magnetic latitude. If there is any appreciable permanent magnetism, observations of the inclination on shore and on board, and of the horizontal force, should be made in at least two magnetic latitudes. This would be sufficient if a, P, d, R remained absolutely constant. As that appears not to be

the case, as many observations as possible should be made of the inclination on shore and on board, with corresponding observations of the horizontal force. Such observations should be made with great care when the vessel is on or near the magnetic equator and before and after any rapid change of magnetic latitude, and whenever the vessel returns to a place where the observations have been made before on board the same vessel, under the same circumstances as to the distribution of her iron.

"When the permanent magnetism is symmetrically distributed, $Q=0$ and $M=0$, and the other constants may be easily, and probably with great accuracy, determined from the following equations. The small letter suffixed to the symbol of a function indicating the affected value observed with the vessel's head on the N., W., S., E. (affected) points,

$$A' = \frac{H_n + H_s}{2H} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (15.)$$

$$a \tan \theta + \frac{P}{A'H} = L = \frac{H_n - H_s}{H_n + H_s} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (16.)$$

$$b = \frac{H_w + H_e}{2\sqrt{H_n H_s}} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (17.)$$

$$d \tan \theta + \frac{R}{A'H} = N = \frac{H_n \tan \delta_n + H_s \tan \delta_s}{H_n + H_s} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (18.)$$

$$c = \frac{H_n \tan \delta_n - H_s \tan \delta_s}{H_n + H_s} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (19.)$$

"The values of H_n, H_s, H_e, H_w, are given by the square of the number of vibrations of a horizontal needle made in a given time, and beginning to vibrate in a given arc, and require no correction except for temperature.

"If n, s, represent the number of vibrations made by such a needle in the same time, with the ship's head successively on the north and south points, and if Δ represent the value of δ when $\zeta' = \pm 90$, the values of L and Δ are given by the following simple expressions:—

"If $\tan \lambda = \frac{n}{s}$,

$$L = \cos 2\lambda \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (20.)$$

$$\Delta = 90^\circ - 2\lambda \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (21.)$$

The equations (18.) and (19.) may be put under the form

$$d \tan \theta + \frac{R}{A'H} = N = \frac{\varphi_n \sin \delta_n + \varphi_s \sin \delta_s}{\varphi_n \cos \delta_n + \varphi_s \cos \delta_s} \quad . \quad . \quad . \quad . \quad . \quad (22.)$$

$$c = \frac{\varphi_n \sin \delta_n - \varphi_s \sin \delta_s}{\varphi_n \cos \delta_n + \varphi_s \cos \delta_s} \quad . \quad . \quad . \quad . \quad . \quad (23.)$$

and the values of N and c obtained, but probably with less accuracy, from observations of the total intensity and inclinations made with a Fox's instrument.

"*Note.*—The last equation in the former memorandum is erroneous. The value of ψ cannot be obtained from two observations of the true azimuth of the ship's head, when $\zeta'_1 + \zeta'_2 = 180$, independently of a."

General Table of the Declinations observed on board Her Majesty's Ships Erebus and Terror, between May 1841 and August 1842.

Lat.	Long.	Ship.	No. of observations.	Declination.	Lat.	Long.	Ship.	No. of observations.	Declination.
° ′	° ′			° ′	° ′	° ′			° ′
		On shore			−56 19	211 53	Erebus.	18	−14 47
−42 52	147 24	at Ho-	....	−10 24	−56 54	212 23	Erebus.	8	−13 32
		barton.			−57 03	212 15	Terror.	10	−15 14
−43 30	147 20	Terror.	4	−12 35	−57 16	212 45	Erebus.	13	−13 54
−42 40	148 45	Erebus.	2	−10 06	−58 21	213 00	Terror.	9	−17 34
−42 17	149 30	Terror.	5	−11 49	−58 20	213 13	Erebus.	12	−14 37
−40 40	149 23	Erebus.	2	− 9 51	−62 49	212 13	Erebus.	12	−20 14
−40 51	149 21	Terror.	5	−11 11	−62 46	212 13	Terror.	15	−20 03
−37 48	150 21	Erebus.	10	−11 01	−63 19	210 22	Erebus.	6	−20 39
−37 54	150 20	Terror.	8	−10 38	−63 23	210 05	On ice.	5	−19 59
−37 14	151 34	Erebus.	13	− 9 31	−63 23	209 43	Erebus.	14	−20 44
−37 10	151 32	Terror.	10	−11 32	−63 21	209 48	Terror.	17	−20 56
		On shore			−64 29	206 55	Erebus.	11	−22 00
−33 51	151 17	at Syd-	....	− 9 51	−64 48	206 10	Terror.	9	−22 55
		ney.			−64 54	206 05	Erebus.	8	−22 51
−33 56	151 00	Terror.	4	−11 18	−65 14	205 56	Erebus.	8	−21 51
−33 54	153 50	Erebus.	2	−10 07	−65 30	205 57	Erebus.	8	−22 46
−33 35	162 47	Terror.	10	−14 26	−66 04	203 51	Erebus.	4	−24 13
−33 33	162 01	Erebus.	8	−12 02	−65 32	204 57	Terror.	7	−24 27
−33 41	166 26	Erebus.	8	−13 34	−66 22	203 40	Erebus.	11	−25 36
−33 48	166 29	Terror.	16	−13 40	−66 04	203 16	Erebus.	8	−26 59
−33 32	167 35	Erebus.	7	−13 27	−66 10	203 37	Terror.	7	−27 24
−33 37	168 04	Terror.	12	−15 02	−66 16	204 39	Erebus.	6	−26 36
−33 42	169 44	Erebus.	11	−12 54	−66 15	204 23	Erebus.	10	−25 55
−34 15	172 33	Terror.	9	−13 45	−66 04	204 14	Erebus.	16	−25 48
−34 31	173 28	Erebus.	11	−13 56	−66 02	204 00	Terror.	18	−26 48
−34 32	173 47	Terror.	5	−13 42	−66 00	204 11	Erebus.	11	−25 26
		On shore,			−65 58	203 54	Terror.	11	−25 00
−35 16	174 00	Bay of	....	−13 36	−65 57	204 14	Erebus.	13	−25 24
		Islands.			−65 58	203 54	Terror.	11	−25 59
−36 39	177 58	Erebus.	11	−14 24	−65 55	203 28	Erebus.	17	−24 58
−38 03	179 32	Terror.	10	−14 55	−65 47	202 13	On ice.	6	−25 15
−38 02	179 51	Erebus.	13	−14 44	−65 59	203 07	Terror.	15	−26 24
−39 29	182 42	Terror.	11	−16 55	−67 38	204 20	Erebus.	9	−27 46
−39 10	182 43	Erebus.	13	−14 43	−67 40	204 10	Terror.	9	−28 19
−40 51	183 16	Erebus.	11	−12 57	−67 20	202 02	Erebus.	8	−27 36
−41 59	183 28	Terror.	19	−15 13	−67 19	202 35	Terror.	11	−28 37
−42 02	183 31	Erebus.	11	−14 24	−67 19	201 56	Erebus.	8	−28 12
−46 09	183 59	Erebus.	13	−16 35	−67 20	201 40	Terror.	11	−28 33
−47 05	184 30	Terror.	11	−15 17	−68 32	200 07	Erebus.	14	−30 25
−47 32	184 52	Erebus.	11	−15 45	−68 24	199 57	Terror.	13	−32 43
−48 53	186 48	Erebus.	15	−16 23	−68 47	199 45	Erebus.	13	−32 33
−49 21	188 32	Terror.	7	−16 52	−68 52	199 40	Terror.	7	−30 47
−49 28	189 00	Erebus.	8	−17 51	−70 10	186 15	Erebus.	9	−35 42
−49 57	191 10	Terror.	7	−16 36	−70 25	185 38	Terror.	11	−38 55
−50 03	191 27	Erebus.	12	−18 23	−70 33	185 22	Erebus.	11	−38 21
−50 54	192 33	Erebus.	6	−18 18	−70 32	185 13	Terror.	12	−38 17
−50 53	192 30	Terror.	8	−16 37	−70 23	184 31	Erebus.	10	−37 35
−51 39	194 53	Erebus.	18	−15 16	−70 14	184 00	Terror.	17	−37 19
−51 50	195 06	Terror.	8	−15 14	−70 14	183 52	Erebus.	11	−36 28
−52 43	202 14	Erebus.	10	−13 58	−71 04	180 46	Terror.	5	−40 45
−53 05	204 33	Terror.	11	−14 54	−72 10	180 58	Erebus.	1	−45 37
−53 10	205 28	Erebus.	12	−13 06	−73 14	181 08	Terror.	2	−51 48
−54 54	209 24	Erebus.	8	−14 26	−75 06	173 14	Erebus.	3	−77 17
−56 20	211 40	Terror.	14	−15 14					

Observations of Declination. (Continued.)

Lat.	Long.	Ship.	No. of observations.	Declination.	Lat.	Long.	Ship.	No. of observations.	Declination.
−75° 40′	174° 56′	Terror.	5	−76° 03′	−58° 50′	222° 00′	Terror.	4	−16° 03′
−76 48	182 33	Erebus.	6	−86 23	−58 58	227 00	Terror.	1	−17 01
−76 54	182 17	Terror.	3	−82 28	−59 04	229 00	Erebus.	4	−17 49
−76 12	191 40	Terror.	2	−70 22	−60 18	236 30	Terror.	3	−20 57
−76 42	194 37	Erebus.	10	−79 57	−60 14	236 32	Erebus.	3	−20 56
−76 46	194 40	Terror.	8	−81 23	−60 02	240 31	Terror.	1	−20 48
−78 03	197 31	Erebus.	10	−87 31	−59 17	245 40	Erebus.	1	−20 14
−77 57	197 54	Terror.	8	−88 01	−58 28	251 40	Terror.	4	−22 46
−77 44	198 07	Erebus.	10	−88 08	−58 40	251 52	Erebus.	3	−21 47
−75 17	195 06	Terror.	5	−64 33	−58 40	254 59	Erebus.	4	−23 28
−74 49	193 56	Erebus.	6	−62 17	−58 36	255 20	Terror.	7	−24 46
−71 56	186 36	Erebus.	2	−45 11	−58 46	257 50	Terror.	3	−26 13
−71 08	184 54	Erebus.	5	−39 20	−58 46	258 07	Erebus.	3	−25 25
−70 58	184 03	Terror.	3	−38 26	−59 00	267 56	Terror.	8	−26 25
−70 10	180 20	Terror.	3	−31 26	−59 01	268 34	Erebus.	9	−26 17
−69 50	180 16	Erebus.	12	−30 50	−59 02	272 04	Erebus.	1	−26 51
−68 17	183 27	Erebus.	12	−27 32	−59 04	272 20	Terror.	4	−27 08
−68 02	183 35	Terror.	4	−28 50	−58 51	276 04	Erebus.	5	−26 18
−67 30	185 00	Terror.	7	−29 46	−58 55	276 26	Terror.	7	−28 25
−67 25	186 42	Erebus.	4	−27 32	−58 21	279 48	Terror.	10	−27 13
−65 51	190 25	Terror.	6	−25 02	−58 20	280 27	Erebus.	5	−25 04
−65 07	192 24	Erebus.	7	−23 40	−58 30	282 00	Terror.	10	−26 49
−63 33	194 53	Erebus.	1	−21 57	−58 30	282 05	Erebus.	8	−26 14
−62 26	195 40	Terror.	4	−19 41	−58 32	283 40	Erebus.	7	−26 18
−62 20	196 15	Erebus.	5	−19 51	−58 29	283 33	Terror.	8	−26 13
−61 00	199 00	Terror.	4	−19 49	−57 35	288 54	Terror.	1	−25 16
−61 02	199 25	Erebus.	8	−18 42	−56 46	294 30	Terror.	2	−20 26
−60 20	205 12	Terror.	4	−18 20	−52 14	301 09	Terror.	4	−18 25
−60 26	203 26	Erebus.	4	−17 31	−52 16	301 06	Erebus.	6	−16 29
−60 16	212 59	Erebus.	4	−17 01					
−60 05	213 51	Terror.	6	−17 19	−51 32	301 53	On shore at Port Louis*.	....	−17 36
−58 59	220 30	Erebus.	6	−15 30					

* The mean monthly results with the magnetometers of the Expedition at the observatory at Port Louis at the Falkland Islands were as follows:—

April . . .	1 to 23.	−17° 50′·3
May . . .	1 to 31.	−17 43·7
June . . .	1 to 30.	−17 38·1
July . . .	1 to 31.	−17 35·6
August . .	1 to 31.	−17 33·0
September	1 to 30.	−17 32·3
October .	1 to 31.	−17 30·2
November	1 to 26.	−17 26·7

Mean corresponding to August 15, 1842. −17° 36′·2.

The easterly declination appears to be decreasing very rapidly at the Falkland Islands.

General Table of the Inclinations observed on board Her Majesty's Ships Erebus and Terror, between May 1841 and August 1842.

Lat.	Long.	Ship.	No. of observations.	Inclination.	Lat.	Long.	Ship.	No. of observations.	Inclination.
° ′	° ′			° ′	° ′	° ′			° ′
−43 00	148 28	Erebus.	5	−70 25	−40 47	183 03	Erebus.	5	−62 21
−42 43	148 55	Terror.	8	−70 44	−40 42	183 05	Terror.	15	−61 56
−42 13	149 25	Erebus.	5	−69 37	−41 34	183 40	Terror.	7	−62 57
−40 51	149 28	Terror.	4	−69 05	−41 49	183 41	Erebus.	5	−63 28
−40 55	149 12	Erebus.	4	−68 41	−42 40	183 46	Terror.	7	−63 46
−38 17	150 22	Terror.	4	−66 57	−43 32	183 03	Erebus.	5	−64 44
−37 50	150 22	Erebus.	4	−66 36	−43 56	183 04	Terror.	15	−65 22
−37 28	151 30	Terror.	4	−66 22	−45 40	183 20	Erebus.	5	−66 35
−37 21	151 33	Erebus.	5	−66 01	−45 39	183 18	Terror.	14	−66 43
−36 21	151 39	Terror.	3	−66 11	−47 19	184 40	Erebus.	5	−67 56
−36 01	151 48	Erebus.	4	−65 04	−47 26	184 42	Terror.	14	−67 32
−34 06	151 19	Terror.	4	−62 58	−48 42	186 25	Terror.	15	−68 40
−33 51	151 20	Erebus.	19	−62 47	−48 43	186 30	Erebus.	6	−69 05
−33 51	151 17	Terror.	7	−62 59*	−49 24	187 23	Terror.	15	−68 59
−33 51	151 17	Erebus.	8	−62 48*	−49 23	188 29	Erebus.	9	−69 41
−33 51	151 17	Terror.	11	−62 52	−49 30	189 19	Terror.	14	−68 55
−33 51	151 17	Erebus.	7	−62 42	−50 03	191 20	Terror.	14	−68 43
−33 58	153 35	Terror.	8	−62 30	−50 24	191 40	Erebus.	10	−69 43
−33 52	154 07	Erebus.	5	−62 47	−50 38	192 05	Terror.	14	−69 25
−33 56	156 38	Terror.	4	−61 46	−51 48	194 25	Terror.	15	−69 51
−33 51	157 18	Erebus.	5	−62 07	−51 48	196 20	Erebus.	10	−70 21
−33 31	160 20	Terror.	4	−61 04	−52 28	199 05	Terror.	11	−70 10
−33 27	160 43	Erebus.	5	−61 30	−52 51	203 56	Terror.	8	−70 01
−33 42	164 05	Terror.	4	−60 52	−52 54	203 00	Erebus.	11	−70 44
−33 38	163 42	Erebus.	5	−60 48	−53 01	205 08	Erebus.	6	−70 10
−33 38	166 28	Erebus.	5	−60 07	−53 12	205 40	Terror.	15	−69 52
−33 44	166 37	Terror.	10	−59 55	−54 31	208 46	Terror.	11	−70 10
−33 33	167 38	Terror.	9	−59 58	−54 53	209 24	Terror.	12	−70 21
−33 22	167 40	Erebus.	5	−59 39	−55 01	209 47	Erebus.	10	−70 58
−33 00	169 00	Terror.	9	−58 43	−55 50	211 10	Erebus.	10	−71 28
−32 58	169 20	Erebus.	5	−59 04	−56 14	211 43	Terror.	14	−71 41
−32 12	170 27	Erebus.	4	−58 33	−56 39	212 10	Erebus.	10	−72 18
−32 11	171 01	Terror.	11	−57 28	−56 06	212 20	Erebus.	6	−72 08
−33 57	171 58	Erebus.	8	−58 24	−56 40	211 57	Terror.	12	−72 00
−33 55	171 59	Terror.	5	−58 24	−57 06	212 12	Terror.	12	−72 14
−34 29	173 36	Erebus.	6	−58 26	−57 57	213 02	Terror.	10	−73 09
−33 58	172 06	Terror.	7	−58 14	−58 38	213 10	Terror.	11	−73 45
−34 15	172 50	Terror.	10	−58 48	−58 39	213 17	Erebus.	11	−73 45
−34 24	173 43	Terror.	7	−59 00	−61 12	213 52	Terror.	14	−75 32
−35 16	174 00	Terror.	3	−59 36	−61 18	213 57	Erebus.	11	−75 32
−35 16	174 00	Erebus.	10	−59 31†‡	−62 36	212 36	Terror.	8	−76 37
−35 16	174 00	Terror.	14	−59 25‡	−62 40	212 53	Erebus.	7	−76 36
−35 16	174 23	Erebus.	10	−59 28	−63 11	210 18	Terror.	12	−77 37
−36 05	176 17	Terror.	12	−59 20	−63 23	210 02	Erebus.	5	−77 26
−36 27	177 34	Erebus.	5	−59 54	−63 23	210 02	Erebus.	4	−77 25§
−38 17	179 51	Erebus.	6	−60 34	−63 23	210 02	Erebus.	3	−77 30
−38 16	179 58	Terror.	15	−60 37	−63 36	208 20	Terror.	10	−77 53
−38 54	182 17	Terror.	17	−61 21	−63 49	208 29	Terror.	10	−77 56
−39 08	182 30	Erebus.	11	−61 34	−63 47	208 26	Erebus.	5	−77 57
−39 21	182 57	Terror.	16	−61 15	−64 25	206 29	Terror.	14	−78 30

* On shore at Garden Island, Sydney; inclination by needles whose poles were reversed, −62° 49′·1.

† Correct; in page 174 it is printed by mistake −59° 29′.

‡ On shore at the Bay of Islands, New Zealand; inclination by needles whose poles are reversed, −59° 31′·9.

§ On ice; the inclination observed with needles whose poles were reversed, was −77° 23′·3.

General Table of Inclination. (Continued.)

Lat.	Long.	Ship.	No. of observations.	Inclination.	Lat.	Long.	Ship.	No. of observations.	Inclination.
−64° 42′	206° 47′	Erebus.	8	−78° 20′	−69° 53′	182° 51′	Terror.	7	−84° 09′
−65 13	206 03	Erebus.	11	−78 57	−70 37	181 09	Erebus.	9	−84 06
−65 26	205 04	Terror.	15	−79 16	−71 03	180 57	Terror.	8	−84 20
−65 47	204 19	Terror.	13	−79 26	−72 46	181 46	Erebus.	6	−85 04
−65 47	204 19	Terror.	13	−79 28	−72 07	181 50	Terror.	9	−84 59
−65 50	204 08	Terror.	11	−79 30	−73 08	181 03	Terror.	9	−85 22
−65 58	204 03	Erebus.	22	−79 31*	−73 53	180 06	Erebus.	2	−86 02
−65 59	204 03	Terror.	8	−79 39	−74 56	173 36	Erebus.	6	−86 52
−66 08	203 50	Terror.	10	−79 39	−74 59	173 40	Terror.	13	−87 05
−66 06	203 41	Erebus.	12	−79 53	−75 10	173 08	Erebus.	5	−86 59
−66 19	203 09	Terror.	14	−80 01	−75 59	175 13	Erebus.	6	−86 44
−66 26	203 25	Erebus.	13	−79 57	−76 05	174 58	Terror.	8	−87 03
−66 21	203 34	Terror.	6	−80 03	−76 58	181 03	Erebus.	5	−86 46
−66 20	203 59	Terror.	9	−79 52	−77 03	181 35	Terror.	8	−86 56
−66 34	203 34	Erebus.	42	−79 55	−76 43	184 30	Erebus.	6	−86 07
−66 05	204 02	Terror.	12	−79 51	−76 48	184 58	Terror.	8	−86 30
−66 01	204 04	Terror.	12	−79 50	−76 15	191 10	Terror.	9	−85 59
−66 11	204 21	Erebus.	14	−79 44	−76 03	193 43	Erebus.	2	−85 18
−66 13	204 33	Erebus.	11	−79 34	−76 42	194 42	Erebus.	6	−85 25
−65 59	204 01	Erebus.	14	−79 38	−76 48	194 21	Terror.	15	−85 12
−65 57	203 56	Terror.	14	−79 47	−77 05	194 38	Erebus.	5	−85 24
−65 53	203 29	Terror.	10	−79 51	−77 47	197 25	Terror.	9	−84 49
−66 11	202 12	Terror.	13	−79 48	−77 45	197 48	Erebus.	5	−84 49
−66 12	203 04	Erebus.	8	−79 35	−77 12	199 24	Terror.	8	−85 35
−66 08	201 46	Terror.	11	−79 35	−74 50	193 45	Erebus.	6	−84 49
−65 49	202 02	Erebus.	4	−79 47†	−75 20	194 36	Terror.	9	−85 46
−65 50	202 14	Terror.	13	−79 38	−72 46	189 59	Erebus.	5	−84 38
−66 09	202 56	Erebus.	9	−79 33	−73 10	189 41	Terror.	7	−85 08
−67 02	201 00	Terror.	12	−80 22	−72 01	187 35	Erebus.	5	−84 10
−66 39	202 14	Erebus.	6	−80 01	−71 01	187 37	Terror.	9	−84 56
−67 12	202 12	Terror.	10	−80 06	−71 08	184 59	Erebus.	6	−84 04
−67 36	204 00	Erebus.	9	−80 22	−71 12	184 20	Terror.	10	−84 37
−67 46	204 17	Terror.	15	−80 43	−69 54	179 55	Terror.	8	−84 30
−67 47	204 17	Terror.	15	−80 48	−69 52	180 04	Erebus.	5	−83 34
−67 16	203 20	Terror.	16	−80 44	−69 44	179 53	Erebus.	5	−83 31
−67 19	202 52	Erebus.	11	−80 26	−68 09	183 10	Terror.	7	−82 26
−67 14	201 34	Terror.	18	−80 35	−68 04	183 25	Erebus.	10	−82 13
−67 57	200 00	Erebus.	7	−80 46	−67 37	186 06	Terror.	15	−81 33
−68 38	199 57	Terror.	14	−81 18	−67 31	185 13	Erebus.	6	−81 51
−68 33	199 52	Erebus.	11	−81 14	−67 09	188 02	Terror.	7	−81 03
−68 46	199 38	Terror.	11	−81 33	−67 19	188 10	Erebus.	5	−81 02
−68 59	195 54	Erebus.	6	−81 54	−65 18	191 39	Terror.	10	−79 42
−68 52	198 24	Terror.	7	−82 30	−65 21	191 43	Erebus.	5	−79 19
−69 48	192 25	Erebus.	5	−82 35	−63 30	194 15	Terror.	7	−78 30
−69 55	192 17	Terror.	10	−83 00	−63 30	194 22	Erebus.	6	−78 11
−70 05	191 03	Terror.	9	−83 20	−62 17	195 55	Terror.	7	−77 30
−70 07	191 11	Erebus.	6	−82 51	−62 16	196 10	Erebus.	5	−77 17
−70 26	189 00	Erebus.	5	−83 07	−61 06	198 08	Terror.	9	−76 32
−70 18	186 01	Erebus.	5	−83 18	−61 11	198 45	Erebus.	5	−76 34
−70 12	186 23	Terror.	17	−83 23	−60 50	200 11	Erebus.	5	−75 33
−70 39	185 31	Erebus.	6	−83 35	−60 57	199 03	Terror.	7	−75 08
−70 32	185 38	Terror.	10	−83 30	−60 18	204 46	Erebus.	7	−75 08
−70 11	183 50	Erebus.	5	−83 33	−60 15	208 06	Terror.	7	−74 21
−69 56	184 43	Terror.	8	−84 03	−60 13	211 44	Erebus.	6	−74 21

* The inclination observed in Lat. −65° 59′, Long. 204° 14′, with needles whose poles were reversed, was −79° 31′·0.

† Observed on ice; inclination with needles whose poles were reversed, −79° 39′·5.

General Table of Inclination. (Continued.)

Lat.	Long.	Ship.	No. of observations.	Inclination.	Lat.	Long.	Ship.	No. of observations.	Inclination.
° ′	° ′			° ′	° ′	° ′			° ′
−60 16	211 52	Terror.	8	−74 14	−59 00	267 18	Erebus.	6	−67 39
−59 58	216 28	Terror.	7	−73 36	−59 02	271 58	Erebus.	5	−67 01
−59 24	218 55	Erebus.	11	−73 30	−59 01	272 06	Terror.	8	−66 53
−59 07	219 12	Terror.	17	−73 48	−58 54	276 18	Terror.	7	−66 10
−58 53	222 27	Erebus.	7	−73 38	−58 51	277 05	Erebus.	6	−65 27
−59 04	228 09	Terror.	9	−73 25	−58 25	279 44	Terror.	8	−64 44
−59 03	228 33	Erebus.	7	−72 57	−58 23	280 03	Erebus.	5	−64 49
−59 39	232 48	Erebus.	5	−72 54	−58 31	281 38	Terror.	9	−63 48
−59 45	233 55	Erebus.	4	−72 51	−58 29	282 10	Erebus.	5	−63 41
−60 09	236 11	Terror.	11	−73 01	−58 36	285 33	Terror.	7	−63 00
−60 16	236 11	Erebus.	5	−73 00	−58 31	285 56	Erebus.	5	−63 05
−60 21	237 02	Erebus.	5	−72 45	−57 21	289 36	Terror.	7	−61 36
−60 22	237 14	Terror.	10	−73 08	−57 22	289 50	Erebus.	5	−61 15
−60 20	237 54	Erebus.	9	−72 44	−57 26	291 36	Terror.	8	−59 52
−60 01	241 31	Erebus.	5	−72 40	−57 11	292 14	Erebus.	6	−58 51
−59 17	245 40	Erebus.	5	−71 29	−56 37	294 34	Terror.	7	−59 02
−59 11	246 37	Terror.	10	−71 24	−56 40	294 46	Erebus.	5	−59 01
−59 15	248 12	Erebus.	5	−71 26	−54 48	297 21	Terror.	7	−56 48
−58 59	249 18	Erebus.	6	−71 04	−54 50	298 08	Erebus.	4	−56 10
−58 26	251 42	Terror.	7	−70 55	−52 54	300 27	Erebus.	5	−53 52
−58 29	252 18	Erebus.	5	−70 50	−52 34	300 10	Terror.	15	−53 25
−58 33	254 45	Terror.	7	−70 16	−52 03	301 56	Erebus.	3	−52 34
−58 35	255 10	Erebus.	5	−70 11	−51 42	301 36	Terror.	7	−52 04
−58 42	257 44	Terror.	10	−69 50	−51 32	301 53	Erebus.	8	−52 36*
−58 45	257 58	Erebus.	5	−69 47	−51 32	301 53	Terror.	25	−52 15*
−58 58	267 18	Terror.	8	−68 00					

* Observed on shore at the Falkland Islands; the Inclination with needles whose poles were reversed, was 52° 26′2.

General Table of the Intensity of the Magnetic Force, from the observations made on board Her Majesty's Ships Erebus and Terror, between April 1841 and August 1842.

Lat.	Long.	Ship.	No. of observations.	Intensity. London = 1·372.
−43° 00′	148° 28′	Erebus.	2	1·853
−43 03	148 20	Terror.	2	1·849
−42 13	149 29	Erebus.	2	1·823
−42 24	149 30	Terror.	2	1·822
−40 54	149 13	Erebus.	2	1·818
−40 51	149 28	Terror.	2	1·814
−38 17	150 22	Terror.	2	1·795
−37 31	151 09	Erebus.	3	1·769
−37 28	151 30	Terror.	2	1·758
−34 35	151 30	Erebus.	3	1·734
−34 51	151 25	Terror.	3	1·738
−33 51	151 17	Erebus.	14	1·698*
−33 51	151 17	Terror.	16	1·699*
−33 51	151 17	Erebus.	6	1·719
−33 51	151 17	Terror.	4	1·719
−32 52	154 07	Erebus.	2	1·708
−33 57	153 35	Terror.	4	1·703
−33 51	157 18	Erebus.	2	1·680
−33 56	156 38	Terror.	2	1·679
−33 27	160 43	Erebus.	2	1·668
−33 31	160 20	Terror.	2	1·671
−33 38	163 42	Erebus.	2	1·655
−33 42	163 50	Terror.	4	1·658
−33 41	166 23	Erebus.	2	1·638
−33 44	166 37	Terror.	5	1·627
−33 22	167 40	Erebus.	2	1·630
−33 34	167 37	Terror.	5	1·600
−32 58	169 20	Erebus.	2	1·620
−32 58	169 20	Terror.	4	1·604
−32 11	171 02	Terror.	6	1·589
−33 32	171 59	Erebus.	6	1·596
−33 57	172 04	Terror.	6	1·601
−34 15	172 50	Terror.	5	1·597
−34 24	173 43	Terror.	4	1·619
−35 16	174 00	Erebus.	26	1·607†
		Terror.	24	1·608†
−35 16	174 00	Terror.	2	1·610
−35 16	174 00	Erebus.	2	1·620
−36 20	177 27	Terror.	4	1·616
−35 15	173 39	Erebus.	2	1·624
−36 27	177 34	Erebus.	2	1·625
−38 13	179 46	Terror.	8	1·634
−38 17	179 31	Erebus.	2	1·627
−38 54	182 05	Terror.	10	1·640
−39 10	182 58	Erebus.	4	1·628
−40 02	183 02	Terror.	16	1·652
−40 47	183 03	Erebus.	2	1·672
−41 34	183 40	Terror.	10	1·666
−41 49	183 41	Erebus.	2	1·684
−42 40	183 46	Terror.	4	1·682
−43 32	183 03	Erebus.	2	1·714
−43 54	183 06	Terror.	8	1·707
−45 39	183 18	Terror.	8	1·733
−46 29	184 00	Erebus.	4	1·744
−47 26	184 37	Terror.	8	1·753
−48 18	185 54	Terror.	10	1·772
−49 04	187 11	Erebus.	7	1·767
−49 05	186 54	Terror.	10	1·772
−49 27	189 13	Erebus.	5	1·773
−49 24	187 23	Terror.	11	1·772
−49 27	189 51	Terror.	14	1·775
−49 50	190 46	Terror.	10	1·766
−50 14	191 06	Erebus.	7	1·780
−50 08	191 39	Terror.	6	1·771
−50 42	192 11	Terror.	14	1·777
−51 34	194 29	Erebus.	5	1·806
−51 37	194 00	Terror.	10	1·794
−52 13	197 03	Terror.	9	1·799
−52 43	201 40	Erebus.	7	1·822
−52 52	204 31	Terror.	20	1·820
−53 01	205 08	Erebus.	5	1·825
−53 31	206 14	Terror.	10	1·834
−54 54	209 16	Terror.	13	1·814
−55 08	210 00	Erebus.	6	1·846
−56 14	211 43	Terror.	8	1·836
−56 38	211 30	Erebus.	8	1·851
−56 30	211 50	Terror.	10	1·841
−57 04	212 06	Terror.	8	1·843
−58 08	212 40	Erebus.	4	1·866
−57 44	212 59	Terror.	8	1·863
−58 32	213 09	Terror.	14	1·878
−58 45	213 19	Erebus.	7	1·888
−61 02	213 52	Terror.	14	1·892
−61 20	213 57	Erebus.	4	1·923
−62 34	212 34	Terror.	10	1·916
−62 40	212 53	Erebus.	2	1·937
−63 21	209 37	Terror.	8	1·910
−63 23	210 02	Erebus.	2	1·952
−63 23	210 02	Erebus.	2	1·938‡
−64 02	207 33	Terror.	8	1·927
−63 47	208 26	Erebus.	6	1·945
−64 49	206 36	Erebus.	8	1·948
−64 51	206 19	Terror.	8	1·943
−65 26	205 04	Terror.	8	1·931
−66 00	204 09	Erebus.	15	1·971
−65 50	204 12	Terror.	8	1·950
−66 33	203 28	Erebus.	4	1·981
−66 09	203 51	Terror.	5	1·949
−66 09	204 26	Erebus.	11	1·970
−66 07	204 00	Terror.	18	1·944
−66 10	203 58	Erebus.	12	1·973
−65 57	203 56	Terror.	14	1·949

* On shore at Garden Island, Sydney.

† On shore at the Bay of Islands, New Zealand.

‡ Observed on ice.

General Table of the Intensity of the Magnetic Force. (Continued.)

Lat.	Long.	Ship.	No. of observations.	Intensity. London = 1·372.
−66 03	202 29	Terror.	12	1·945
−65 49	202 02	Erebus.	6	1·959*
−65 47	202 08	Terror.	10	1·948*
−67 16	203 40	Erebus.	8	1·976
−67 46	204 17	Terror.	10	1·960
−67 37	204 12	Terror.	10	1·963
−67 21	202 15	Erebus.	6	1·967
−67 12	202 24	Terror.	6	1·946
−67 15	201 34	Terror.	8	1·935
−68 08	199 57	Terror.	8	1·955
−68 29	199 55	Erebus.	9	1·991
−68 46	199 39	Terror.	13	1·961
−68 52	198 24	Terror.	10	1·966
−69 29	192 24	Erebus.	8	2·001
−70 00	191 36	Terror.	9	1·965
−70 14	196 16	Terror.	15	1·976
−70 18	185 16	Terror.	10	1·983
−70 23	185 33	Erebus.	8	1·996
−70 27	181 59	Terror.	8	1·988
−70 28	181 20	Erebus.	5	1·999
−72 41	181 41	Terror.	8	2·001
−72 46	181 46	Erebus.	4	1·989
−74 58	173 34	Terror.	10	2·008
−75 05	173 17	Erebus.	9	2·024
−75 42	174 14	Terror.	7	2·006
−76 33	180 09	Erebus.	6	2·021
−77 02	181 37	Terror.	4	2·007
−76 48	184 46	Terror.	4	2·009
−76 20	191 26	Terror.	4	2·024
−76 24	184 54	Terror.	4	2·004
−77 00	194 38	Erebus.	8	2·009
−77 13	193 52	Terror.	10	2·011
−77 47	197 25	Terror.	4	2·001
−77 14	199 29	Terror.	10	1·992
−75 20	194 36	Terror.	4	2·003
−74 50	193 45	Erebus.	2	1·999
−73 10	189 21	Terror.	4	2·000
−72 24	188 47	Erebus.	4	1·990
−72 03	187 40	Terror.	10	1·999
−71 34	186 09	Terror.	10	1·999
−71 08	184 59	Erebus.	4	2·009
−69 54	179 55	Terror.	4	1·999
−69 48	179 56	Erebus.	4	1·994
−68 09	183 10	Terror.	4	1·981
−68 04	183 25	Erebus.	4	1·981
−67 35	185 18	Terror.	10	1·978
−67 24	187 51	Terror.	8	1·981
−66 56	189 36	Erebus.	4	1·980
−65 17	191 58	Terror.	10	1·955
−63 30	194 15	Terror.	4	1·942
−63 05	195 18	Erebus.	6	1·941
−61 57	196 33	Terror.	14	1·916
−61 07	199 05	Erebus.	7	1·924
−60 19	203 42	Terror.	4	1·920
−60 16	207 52	Erebus.	4	1·881
−60 15	209 55	Terror.	8	1·907
−59 13	216 28	Terror.	4	1·910
−59 22	218 14	Terror.	4	1·900
−58 33	220 27	Erebus.	7	1·878
−58 49	221 25	Terror.	4	1·913
−59 01	227 43	Terror.	4	1·897
−59 29	231 53	Erebus.	6	1·890
−60 18	236 31	Erebus.	6	1·909
−60 05	235 56	Terror.	4	1·884
−60 17	236 38	Terror.	4	1·892
−60 20	237 55	Erebus.	4	1·907
−60 24	237 29	Terror.	4	1·907
−59 05	247 27	Terror.	4	1·875
−59 31	245 13	Erebus.	8	1·861
−58 26	251 42	Terror.	4	1·885
−58 33	254 45	Terror.	10	1·824
−58 36	255 30	Erebus.	7	1·821
−58 47	258 13	Terror.	8	1·832
−58 59	267 50	Terror.	4	1·783
−59 01	272 06	Terror.	4	1·747
−58 58	272 35	Erebus.	6	1·747
−58 24	276 18	Terror.	4	1·722
−58 27	280 20	Terror.	12	1·672
−58 27	282 04	Erebus.	5	1·652
−58 36	285 33	Terror.	4	1·648
−57 23	290 34	Terror.	8	1·592
−57 16	292 01	Erebus.	5	1·544
−55 42	295 57	Terror.	8	1·495
−56 03	295 54	Erebus.	3	1·478
−52 40	299 52	Terror.	9	1·355
−52 54	300 57	Erebus.	5	1·367
−52 05	301 39	Terror.	8	1·340
−51 32	301 53	Erebus.	24	1·333†
−51 32	301 53	Terror.	30	1·336†

* Observed on ice.

† On shore at the Falkland Islands.

Declinations observed on board Her Majesty's Ship Erebus, between June 1841 and August 1842.

The Observers are distinguished in the column of Initials as follows:—R. Captain Ross; S. Lieut. Sibbald; W. Lieut. Wood; T. Mr. Tucker, Master; Sm. Mr. Smith, and O. Mr. Oakley, Mates; Y. Mr. Yule, Second Master. East Declination is characterised by the sign—.

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
May 10	−42 52	147 24	R.	−10 24·5	Mean, 7 days' hourly observations with Declin. No. 1.						At the Magnetic Observatory.
19	Hobarton, Van Diemen Island.		R.	−10 24·3	Mean, 7 days' hourly observations with Declin. No. 2.					−10 24	
			R.	−10 36	N.	To obtain corrections for the ship's attraction.					
			R.	−11 24	N. by W.						
			R.	−12 11	N.N.W.						
			R.	−12 44	N. W. by N.						
			R.	−13 04	N.W.						
			R.	−13 22	N.W. by W.						
			R.	−14 01	W.N.W.						
			R.	−14 42	W. by N.						
			R.	−15 08	W.						
			R.	−15 06	W. by S.						
			R.	−14 51	W.S.W.						
			R.	−14 29	S.W. by W.						
			R.	−13 51	S.W.						
			R.	−13 08	S.W. by S.						
			R.	−12 25	S.S.W.						
			R.	−10 29	S. by W.						
June 29	At anchor.		R.	− 9 26	S.						
			R.	− 7 38	S. by E.						
			R.	− 7 03	S.S.E.						
			R.	− 6 19	S.E. by S.						
			R.	− 5 36	S.E.						
			R.	− 5 09	S.E. by E.						
			R.	− 4 24	E.S.E.						
			R.	− 4 49	E. by S.						
			R.	− 5 02	E.						
			R.	− 5 24	E. by N.						
			R.	− 6 04	E.N.E.						
			R.	− 6 24	N.E. by E.						
			R.	− 7 01	N.E.						
			R.	− 7 30	N.E. by N.						
			R.	− 8 40	N.N.E.						
			R.	− 9 32	N. by E.						
July 7 P.M.	−43 17	148 07	R.	− 5 33	E.S.E.	−70 50	−4 44	−10 17	−0 37	−10 06	
9 P.M.	−42 04	149 24	T.	−12 30	W.N.W.	−69 40	+3 49	− 8 41			
10 A.M.	−40 55	149 12	T.	−10 15	N. by W.	−68 40	+0 39	− 9 36	−0 37	− 9 51	
10 P.M.	−40 26	149 34	T.	− 8 52	N.		0 00	− 8 52			
11 P.M.	−37 49	150 21	R.	−10 47	N.		0 00	−10 47			
			R.	− 9 57	N.		0 00	− 9 57			
			T.	−10 56	N. by W.		+0 35	−10 21			
			T.	−10 55	N. by W.		+0 35	−10 20			
			R.	−10 54	N. by W.	−66 40	+0 35	−10 19	−0 37	−11 01	
			R.	−10 04	N.		0 00	−10 04			
			R.	−11 44	N.N.W.		+1 10	−10 34			
			S.	−11 53	N. by W.		+0 35	−11 18			
			T.	−11 17	N. by W.		+0 35	−10 42			
	−37 43	150 22	R.	−10 18	N. by W.		+0 35	− 9 43			

Observations of Declination. (Continued.)

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
				° ′ ″		° ′	° ′	° ′	° ′	° ′	
July 12 A.M.	−37 24	151 27	R.	− 6 30	N.E.		−2 10	− 8 40			
			R.	− 6 11	N.E.		−2 10	− 8 21			
			R.	− 5 39	N.E.		−2 10	− 7 49			
	−37 22	151 28	W.	− 7 53	N.N.E.		−1 07	− 9 00			
12 P.M.	−37 17	151 39	S.	− 6 06	N.E. ½ E.		−2 34	− 8 40			
			S.	− 6 37	N.E.		−2 10	− 8 47			
	−37 16	151 37	Y.	− 9 36	N. by w.	−66 00	+0 34	− 9 02	−0 37	− 9 31	
			R.	− 8 34	N. by w.		+0 34	− 8 00			
			S.	− 9 33	N. by w.		+0 34	− 8 59			
			S.	− 9 45	N. by w.		+0 34	− 9 11			
			R.	− 9 29	N. by w.		+0 34	− 8 55			
	−37 11	151 37	T.	− 9 09	N.		0 00	− 9 09			By the magnetometers on shore.
13 A.M.	−36 26	151 42	T.	−12 04	N.N.W.	−65 00	+1 03	−11 01			
Aug. 3	Garden Island, Sydney.		R.	− 9 51·5	.....	.....	.....	.....	.....	− 9 51·5	
	−33 51	151 17									
6 A.M.	−33 54	153 50	S.	− 7 05	E.		−3 13	−10 18			
			T.	− 5 42	E. by N.	−62 40	−3 00	− 8 42	−0 37	−10 07	
8 P.M.	−33 30	160 56	S.	− 7 47	E. by N.		−2 50	−10 37			
			S.	− 7 58	E.		−3 03	−11 01			
			O.	− 7 54	E. by N.	−61 30	−2 50	−10 44			
			R.	− 8 21	E.		−3 03	−11 24	−0 37	−12 02	
			R.	− 6 30	E.		−3 03	− 9 33			
9 A.M.	−33 38	163 50	T.	−10 37	E.		−2 56	−13 13			
			R.	− 9 45	E.	−60 40	−2 56	−12 41			
			T.	− 9 23	E.		−2 56	−12 19			
10 A.M.	−33 42	166 25	R.	−12 53	N.N.E.		−0 48	−13 41			
			T.	−10 59	S.E. by E.		−2 50	−13 49			
			S.	− 9 55	E.		−2 52	−12 47			
			T.	− 9 28	E. by S.	−60 10	−2 59	−12 27	−0 37	−13 34	
			W.	−11 20	E.S.E.		−2 59	−14 19			
	−33 41	166 19	Sm.	− 8 55	E.		−2 52	−11 47			
10 P.M.	−33 39	166 34	O.	− 8 35	E. by N.		−2 39	−11 14			
			T.	−10 50	E. by N.		−2 39	−13 29			
11 A.M.	−33 32	167 34	R.	−11 56	N.E. by N.		−1 10	−13 06			
			T.	−10 46	E.S.E.		−2 56	−13 42			
			W.	−10 32	E. ½ N.		−2 42	−13 14			
			O.	−10 51	E.S.E.	−59 40	−2 56	−13 47	−0 37	−13 27	
			Sm.	− 7 46	E. by S.		−2 56	−10 42			
			T.	−10 32	E.		−2 49	−13 21			
	−33 32	167 41	S.	− 9 03	E. by S.		−2 56	−11 59			
11 P.M.	−33 31	167 51	S.	−11 11	E.N.E.		−2 16	−13 27			
			R.	−11 04	E.N.E.		−2 16	−13 20			
			R.	−11 13	E.	−59 30	−2 48	−14 01			
			O.	−10 48	E. by N.		−2 42	−13 30			
			S.	− 9 45	E. by N.		−2 42	−12 27			
	−33 32	167 59	R.	−10 29	E. by N.		−2 42	−13 11	−0 37	−12 54	
15 A.M.	−33 55	171 58	T.	− 8 13	E. by S.		−2 47	−11 00			
			O.	− 8 02	E. ½ S.		−2 44	−10 46			
			S.	− 8 33	E. ½ S.	−58 10	−2 44	−11 17			
			T.	− 8 15	E. by S.		−2 47	−11 02			
	−33 54	171 58	R.	− 8 22	E. by S. ½ S.		−2 47	−11 09			
16 A.M.	−34 25	172 51	Y.	−14 11	N.N.W. ½ W.		+0 53	−13 18			
			Y.	−13 09	N.W. ½ W.		+1 38	−11 31			
			Y.	−14 46	N.W. by N.		+1 04	−13 42			
			T.	−14 58	N.W. ½ N.	−58 10	+1 14	−13 44	−0 37	−13 56	

Observations of Declination. (Continued.)

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
Aug. 17 A.M.	−34 15	173 12	T.	−11 14	E. by S.	−58 10	−2 48	−14 02	−0 37	−13 56	
17 P.M.	−34 37	173 55	S.	−10 11	E.S.E.		−2 48	−12 59			
			O.	−11 20	E.S.E.		−2 48	−14 08			
			R.	−10 18	E.S.E.		−2 48	−13 06			
			R.	−10 39	E. by S. ½ S.		−2 48	−13 27			
			O.	− 9 25	E. by S. ½ S.		−2 48	−12 13			
			R.	−11 27	E. by S.		−2 48	−14 15			
Aug. & Sept.	Bay of Islands.										By the magnetometers on shore.
	−35 16	174 00	R.	−13 36	.....	.....	.....	.....	.....	−13 36	
Nov. 24 A.M.	−36 27	177 20	SM.	− 8 57	E.S.E.		−2 45	−11 42			
		177 21	O.	− 8 51	E.S.E.		−2 45	−11 36			
24 P.M.	−36 34	177 47	S.	−10 45	S.E. by E.		−2 36	−13 21			
		177 56	S.	−11 46	S.E. by E.		−2 36	−14 22			
	−36 40	177 58	O.	−11 52	S.E. by E.		−2 36	−14 28			
	−36 42	178 08	R.	− 9 47	S.E. by E.	−59 40	−2 36	−12 23	−1 20	−14 24	
	−36 44	178 10	R.	−10 38	S.E. by E.		−2 36	−13 14			
			T.	−10 19	S.E. by E.		−2 36	−12 55			
			T.	−11 20	S.E. by E.		−2 36	−13 56			
	−36 50	178 18	R.	−10 13	S.E. by E.		−2 36	−12 49			
			R.	−10 27	S.E. by E.		−2 36	−13 03			
25 A.M.	−37 59	179 37	T.	−11 54	S.E. by S.		−1 56	−13 50			
			SM.	−11 11	S.E. by S.		−1 56	−13 07			
	−38 01	179 40	T.	−11 07	S.E. ½ S.		−2 09	−13 16			
			SM.	−10 29	S.E. by S.	−60 14	−1 56	−12 25			
			O.	−11 42	S.E. ½ S.		−2 09	−13 51			
			S.	−10 06	S.E.		−2 22	−12 28			
	−38 03	179 41	T.	−11 15	S.E. ½ S.		−2 09	−13 24	−1 20	−14 44	
25 P.M.	−38 22	180 10	R.	−10 43	E.S.E.		−2 49	−13 32			
			Y.	−10 19	S.E. ½ E.		−2 32	−12 51			
	−38 27	180 02	R.	−11 09	S.E. ½ E.	−60 20	−2 32	−13 41			
			R.	−11 26	S.E. by E.		−2 40	−14 06			
			T.	−10 06	S.E. by E. ½ E.		−2 44	−12 50			
			R.	−11 39	S.E. by E.		−2 40	−14 17			
26 P.M.	−39 04	182 29	O.	−11 29	S.E. by E.		−2 44	−14 13			
			T.	−10 10	S.E. ½ E.		−2 35	−12 45			
			T.	−11 05	S.E. by E.		−2 44	−13 49			
	−39 05	182 32	R.	−10 37	S.E. by E. ½ E.	−61 05	−2 49	−13 26			
			R.	− 9 39	E.S.E.		−2 53	−12 32			
			R.	−10 36	S.E. by E.		−2 44	−13 20			
	−39 08	182 36	T.	− 9 49	S.E. by E.		−2 44	−12 33	−1 20	−14 43	
	−39 09	182 40	R.	− 9 49	E.S.E.		−2 53	−12 42			
27 A.M.	−39 16	182 59	T.	−11 47	N.E. by E.		−1 58	−13 45			
			SM.	−11 09	S.E. by E.		−2 48	−13 57			
			S.	−12 33	N.	−61 42	0 00	−12 33			
			T.	−12 30	N.N.E. ½ E.		−0 53	−13 23			
	−39 17	182 58	O.	−12 41	N.N.E. ½ E.		−0 58	−13 39			
28 A.M.	−40 23	183 04	S.	−12 02	S. by E.		−0 45	−12 47			
	−40 27	183 03	T.	−11 20	S. by E.		−0 45	−12 05			
28 P.M.	−40 22	183 14	R.	− 9 10	S.S.E. ½ E.		−1 46	−10 56			
	−40 57		T.	− 9 32	S.S.E.		−1 27	−10 59			
		183 16	R.	− 8 46	S.E. by S.		−2 04	−10 50			
			O.	− 8 53	S.E. ½ S.	−62 12	−2 17	−11 10	−1 20	−12 57	
	−41 07	183 22	R.	− 9 34	S.E.		−2 31	−12 05			
			S.	−10 10	S.E.		−2 31	−12 41			
	−41 09	183 23	R.	−10 33	S.S.E.		−1 26	−11 59			
	−41 10	183 24	R.	− 9 12	S.E. by S.		−2 03	−11 15			
	−41 11	183 25	R.	− 8 56	S.E. by S.		−2 03	−10 59			

Observations of Declination. (Continued.)

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Nov. 29 A.M.	−41 28	183 41	Y.	−15 20	W.S.W.		+3 09	−12 11			
			T.	−14 41	S.W. ½ S.		+2 23	−12 18			
			T.	−11 59	S. by E.		−0 47	−12 46			
			T.	−12 55	S. by E.	−63 20	−0 47	−13 42			
	−41 30	183 43	T.	−13 02	S. by E.		−0 47	−13 49			
			S.	−10 38	S. by E.		−0 47	−11 25	−1 20	−14 24	
			T.	−12 15	S. by E.		−0 47	−13 02			
	−41 31	183 40	O.	−13 14	S. by E.		−0 47	−14 01			
30 A.M.	−43 28	183 04	R.	−13 23	S. ¼ E.		−0 16	−13 39			
			T.	−14 02	S.	−65 00	0 0	−14 02			
	−43 30	183 03	O.	−12 49	S.		0 0	−12 49			
Dec. 1 A.M.	−45 30	183 15	T.	−12 16	S.E. by E. ½ E.		−3 24	−15 40			
			W.	−11 47	S.E. by E.		−3 18	−15 05			
			Y.	−13 08	S.E. by E.	−66 30	−3 18	−16 26			
	−45 32	183 11	T.	−11 02	S.E. by E. ½ E.		−3 24	−14 26			
			W.	−10 22	S.E. by E.		−3 18	−13 40			
		183 15	S.	−12 26	S.E. by E.		−3 18	−15 44			
2 A.M.	−46 40	184 18	T.	−12 30	S.E. by E. ½ E.		−3 44	−16 14	−1 20	−16 35	
			W.	−11 54	S.E. by E.		−3 36	−15 30			
			Y.	−10 33	S.E. by E.		−3 36	−14 09			
			Sm.	−11 24	S.E. by E.	−67 55	−3 36	−15 00			
			T.	−12 31	S.E. by E. ½ E.		−3 44	−16 15			
			T.	−11 33	E.S.E.		−3 52	−15 25			
	−46 45	183 13	Sm.	−11 07	S.E. by E.		−3 36	−14 43			
2 P.M.	−47 26	184 42	S.	−11 28	E. by S.		−3 57	−15 25			
	−47 31	184 50	T.	−11 00	S.E. ½ E.		−3 24	−14 24			
			T.	−11 29	S.E. by E. ½ E.		−3 44	−15 13			
	−47 32	184 53	T.	−10 36	S.E. by E.		−3 36	−14 12			
			W.	−11 28	S.E. ½ E.		−3 24	−14 52			
			S.	−11 32	S.E. by E.	−67 55	−3 36	−15 08	−1 20	−15 45	
			T.	−10 43	S.E. by E.		−3 36	−14 19			
			O.	−11 07	S.E. ½ E.		−3 24	−14 31			
	−47 34	184 55	R.	−10 27	S.E. ¾ E.		−3 30	−13 57			
			R.	− 9 25	S.E. by E.		−3 36	−13 01			
	−47 38	185 00	R.	− 9 47	S.E. by E. ½ E.		−3 44	−13 31			
3 P.M.	−48 50	186 47	S.	−12 19	S.E. by E. ½ E.		−3 11	−15 30			
			S.	−11 26	E.S.E.		−4 04	−15 30			
			T.	−11 35	E. ½ N.		−3 52	−15 27			
	−48 53	186 49	R.	−10 25	S.E. by E.		−3 47	−14 12			
			R.	−11 01	S.E. by E.		−3 47	−14 48			
			O.	−10 53	S.E. by E. ½ E.		−3 55	−14 48			
			Sm.	−11 32	S.E. by E.		−3 47	−15 19			
	−48 50	186 44	Y.	−10 48	S.E. by E. ½ E.	−69 05	−3 55	−14 43	−1 20	−16 23	
			T.	−10 49	S.E. by E.		−3 47	−14 36			
	−48 51	186 44	W.	−10 59	S.E. by E.		−3 47	−14 46			
			S.	−11 20	S.E. by E.		−3 47	−15 07			
			R.	−10 23	E.S.E.		−4 04	−14 27			
	−48 54	186 46	T.	−10 49	E.S.E.		−4 04	−14 53			
	−48 55	186 52	R.	−11 42	S.E. by E.		−3 47	−15 29			
	−48 56	186 53	R.	−12 35	S.E. ½ E.		−3 33	−16 08			
4 A.M.	−49 10	187 32	R.	−12 52	E. by S.		−4 18	−17 10			
5 A.M.	−49 32	188 59	T.	−11 28	E. by S.		−4 18	−15 46			
			O.	−11 12	E. by S.		−4 18	−15 30			
			S.	−13 13	E. by S.		−4 18	−17 31			
5 P.M.	−49 31	189 20	S.	−13 21	E. by S.	−69 40	−4 18	−17 39	−1 20	−17 51	
			W.	−11 45	E. by S.		−4 18	−16 03			
			T.	−12 35	E. by S.		−4 18	−16 53			
	−49 32	189 28	R.	−11 28	E.		−4 07	−15 35			

Observations of Declination. (Continued.)

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Dec. 6 A.M.	−49 57	191 06	R.	−11 47	E. by S.		−4 18	−16 05			
			R.	−12 34	E. by S.		−4 18	−16 52			
			T.	−12 58	E. by S.		−4 18	−17 16			
			O.	−13 50	E. by S.		−4 18	−18 08			
	−50 04	191 15	S.	−13 13	E. by S.		−4 18	−17 31			
6 P.M.	−50 03	191 38	T.	−14 25	N.E. $\frac{3}{4}$ E.		−2 52	−17 17			
			T.	−14 02	E. by N.	−69 37	−3 53	−17 55	−1 20	−18 23	
			T.	−15 52	N.E. by N.		−1 54	−17 46			
			S.	−12 37	E.S.E.		−4 12	−16 49			
	−50 04	191 40	T.	−13 40	E. by S. $\frac{1}{2}$ S.		−4 15	−17 55			
		191 44	R.	−11 21	E.S.E.		−4 12	−15 33			
	−50 06	191 56	S.	−11 44	S.E. $\frac{1}{2}$ E.		−3 40	−15 24			
7 A.M.	−50 36	192 00	Sm.	−15 43	S. by E. $\frac{3}{4}$ E.		−1 40	−17 23			
	−50 51	192 20	S.	−13 39	E.S.E.		−4 14	−17 53			
	−50 54	192 40	R.	−13 51	S.E. $\frac{1}{2}$ S.		−3 06	−16 57			
		192 45	T.	−13 58	S.E.	−69 49	−3 26	−17 24	−1 20	−18 18	
			R.	−12 42	S.E. $\frac{1}{2}$ E.		−3 40	−16 22			
	−50 56	192 44	R.	−12 24	S.E.		−3 26	−15 50			
8 A.M.	−51 30	193 57	T.	−11 39	E. by S.		−4 25	−16 04			
	−51 31	194 00	T.	−11 54	E. by S.		−4 25	−16 19			
			W.	−11 28	E. by S.		−4 25	−15 53			
			W.	−11 27	E. by S.	−70 11	−4 25	−15 52			
			T.	−12 48	E. by S.		−4 25	−17 13			
			Sm.	−13 15	E. by S.		−4 25	−17 40			
	−51 31	194 03	O.	−12 32	E. by S.		−4 25	−16 57			
8 P.M.	−51 41	195 04	T.	− 8 21	E. $\frac{1}{2}$ S.		−4 20	−12 41			
			O.	− 8 34	E. $\frac{1}{2}$ S.		−4 20	−12 54			
			S.	− 9 39	E. $\frac{1}{2}$ S.		−4 20	−13 59	−1 20	−15 16	
			T.	− 9 54	E. $\frac{1}{2}$ S.		−4 20	−14 14			
	−51 45	195 26	R.	− 8 29	E. $\frac{1}{2}$ S.		−4 20	−12 49			
			T.	− 8 27	E. $\frac{1}{2}$ S.	−70 11	−4 20	−12 47			
	−51 46		W.	− 9 09	E. $\frac{1}{2}$ S.		−4 20	−13 29			
			R.	− 8 48	E. $\frac{1}{2}$ S.		−4 20	−13 08			
	−51 47	195 37	R.	− 8 07	E. by S.		−4 25	−12 32			
			T.	− 8 24	E. by S.		−4 25	−12 49			
	−51 49	195 46	R.	− 8 06	E. by S.		−4 25	−12 31			
9 A.M.	−52 26	198 23	T.	− 9 29	E. by S.			−13 59			
			R.	− 9 09	E. by S.	−70 27	−4 30	−13 39			
			O.	− 9 17	E. by S.			−13 47			
11 P.M.	−52 50	204 00	T.	− 8 01	E. $\frac{1}{2}$ N.		−4 15	−12 16			
			S.	− 9 04	E. $\frac{3}{4}$ N.		−4 12	−13 16			
			O.	− 8 14	E. $\frac{1}{2}$ S.		−4 25	−12 39	−1 20	−13 58	
			T.	− 7 05	E.	−70 38	−4 22	−11 27			
			R.	− 6 22	E.S.E.		−4 27	−10 49			
			T.	− 7 35	E.S.E.		−4 27	−12 02			
		203 15	W.	− 7 58	E.S.E.		−4 27	−12 25			
12 A.M.	−53 10	205 15	Sm.	− 6 47	E.S.E.		−4 20	−11 07			
			Y.	− 7 35	E.S.E.		−4 20	−11 55			
			O.	− 7 37	E.S.E.		−4 20	−11 57			
			S.	− 7 55	E.S.E.		−4 20	−12 15			
	−53 04	205 18	T.	− 7 21	E.S.E.		−4 20	−11 41			
			O.	− 7 23	E.S.E.		−4 20	−11 43			
			R.	− 7 23	E.S.E.	−70 11	−4 20	−11 43	−1 20	−13 06	
			T.	− 7 22	E.S.E.		−4 20	−11 42			
			R.	− 7 15	E.S.E.		−4 20	−11 35			
			T.	− 8 08	E.S.E.		−4 20	−12 28			
			W.	− 7 14	E.S.E.		−4 20	−11 34			
12 P.M.	−53 22	206 10	R.	− 7 19	S.E. by E. $\frac{1}{2}$ E.		−4 10	−11 29			

Observations of Declination. (Continued.)

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Dec. 13 A.M.	−54 45	209 02	S.	− 7 35	E.S.E.		−4 27	−12 02			
			T.	− 7 51	S.E. by E. ½ E.		−4 17	−12 08			
	−54 46	209 07	R.	− 7 18	S.E. by E. ½ E.		−4 17	−11 35			
			T.	− 7 06	S.E. by E. ½ E.	−70 47	−4 17	−11 23	−1 20	−14 26	
	−54 48	209 10	W.	− 7 40	S.E. by E.		−4 07	−11 47			
			R.	−10 24	S.E. by E. ½ E.		−4 17	−14 41			
13 P.M.	−55 16	210 14	S.	−11 36	S.E. by E.		−4 07	−15 43			
	−55 17	210 20	S.	−11 20	S.E. by E.		−4 07	−15 27			
14 A.M.	−56 06	211 33	T.	−12 31	S.E. by S.		−3 03	−15 34			
	−56 04		Y.	−12 14	S.E. by S.		−3 03	−15 17			
	−56 10	211 44	T.	−11 45	S.E. by S.		−3 03	−14 48			
			Sm.	−12 52	S.E. by S.		−3 03	−15 55			
	−56 15	211 49	R.	−11 57	S.E. by S.	−72 00	−3 03	−15 00	−1 20	−15 43	
14 P.M.	−56 22	211 56	T.	− 8 36	E. ½ N.		−4 35	−13 11			
			S.	− 9 02	E.N.E.		−4 02	−13 04			
			T.	− 9 44	E.N.E.		−4 02	−13 46			
			T.	−10 01	N.E.		−2 54	−12 55			
			S.	− 9 03	N.E. ½ E.		−3 13	−12 16			
			S.	− 8 11	E. ½ N.		−4 35	−12 46			
		211 58	R.	− 8 51	E.N.E.		−4 02	−12 53			
			W.	− 8 51	E. by N.		−4 27	−13 18			
	−56 23	211 59	R.	− 8 37	S.E. by S.	−72 00	−3 03	−11 40	−1 20	−13 50	
			T.	− 9 10	S.E. by S.		−3 03	−12 13			
			W.	− 9 02	S.E. by S.		−3 03	−12 05			
			T.	− 9 31	S.E. by S.		−3 03	−12 34			
	−56 24	211 59	W.	− 9 44	S.E. by S.		−3 03	−12 47			
15 A.M.	−56 50	212 12	T.	−11 01	S. by E. ½ E.		−1 40	−12 41			
			Sm.	−11 34	S. by E.		−1 08	−12 42			
			Y.	−10 29	S.S.E.		−2 13	−12 42			
			T.	−10 25	S.S.E.		−2 13	−12 38			
			S.	− 9 31	S.S.E.	−72 39	−2 13	−11 44	−1 20	−13 32	
	−56 59	212 41	O.	− 9 21	S.E. by S.		−3 09	−12 30			
			R.	− 8 24	S.E. by S.		−3 09	−11 33			
	−57 01	212 42	R.	− 7 56	S.E. by S.		−3 09	−11 05			
15 P.M.	−57 13	212 45	T.	− 9 41	S.S.E.		−2 10	−11 51			
			S.	− 9 43	S.S.E.		−2 10	−11 53			
			W.	− 9 36	S.S.E.		−2 10	−11 46			
			R.	− 9 45	S.S.E.		−2 10	−11 55			
	−57 14	212 45	T.	− 9 28	S.S.E.		−2 10	−11 38			
			R.	− 9 51	S.S.E.		−2 10	−12 01			
			Y.	−11 51	S.S.E.	−72 12	−2 10	−14 01	−1 20	−13 54	
	−57 16	212 45	T.	−10 12	S.S.E.		−2 10	−12 22			
			T.	− 9 11	E.N.E.		−4 05	−13 16			
			S.	− 8 07	E.N.E.		−4 05	−12 12			
			S.	− 9 29	E.S.E.		−4 47	−14 16			
			S.	− 8 53	S.E.		−3 51	−12 44			
	−57 19	212 47	R.	−11 12	S.S.E.		−2 10	−13 22			
16 A.M.	−58 12	213 09	S.	− 9 20	S.S.E.						
	−58 13	213 08	T	− 9 27	S.S.E.						
			O.	− 9 44	S.S.E.						
			S.	−10 37	S.S.E.						
	−58 15	213 08	T.	−10 08	S.S.E.						
			Y.	−10 47	S.S.E.	−73 55	−2 21	−13 12	−1 20	−14 37	
			T.	−11 56	S.S.E.						
	−58 21	213 17	R.	−12 32	S.S.E.						
			W.	−11 17	S.S.E.						
			R.	−12 08	S.S.E.						
	−58 25	213 06	R.	−11 28	S.S.E.						
17 A.M.	−60 02	213 45	S.	−11 32	S.S.E.	−75 40	−2 40	−14 12			

Observations of Declination. (Continued.)

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Dec. 18 A.M.	−62 40	212 49	T.	−17 18	S. ½ E.		−0 44	−18 02			
			R.	−19 25	S. by W.		+1 28	−17 57			
			W.	−19 14	S. ¼ W.		+0 22	−18 52			
	−62 45	212 44	R.	−20 47	S. by W.		+1 28	−19 19			
			Sm.	−19 54	S. ½ W.		+0 44	−19 10			
18 P.M.	−62 50	211 46	R.	−26 11	S.W. ½ W.		+5 30	−20 41			
	−62 53	211 34	R.	−25 40	S.W. ½ W.		+5 30	−19 10	−1 20	−20 14	
	−62 56	211 20	R.	−23 59	S.W. ½ W.		+5 30	−18 29			
			T.	−23 47	S W. ½ W.		+5 30	−18 17			
			W.	−25 11	S.W. ½ W.		+5 41	−19 30			
			R.	−21 25	S.S.W.		+2 57	−18 28			
	−62 57	211 20	R.	−21 49	S.S.W.	−76 49	+2 57	−18 52			
19 A.M.	−63 19	210 25	S.	−23 12	S.W.		+5 27	−17 45			
	−63 20	210 22	O.	−23 26	S.S.W. ½ W.		+3 45	−19 41			
			W.	−23 32	S.S.W. ½ W.		+3 45	−19 47	−1 20	−20 39	
			T.	−23 34	S.W. by S.		+4 25	−19 09			
			T.	−22 11	S.S.W.		+3 11	−19 00			
	−63 19	210 17	R.	−22 07	S. by W.		+1 33	−20 34			
	−63 23	210 05	R.	−19 19				−19 19	−0 06		H 16s
			R.	−20 43				−20 43	−0 28		H 16?
			R.	−22 35	Observed on ice.	−77 36	.....	−22 35	+1 00	−19 59	H 16s
			R.	−18 24				−18 24	−0 06		H 16s
			R.	−18 44				−18 44	−0 28		H 16?
19 P.M.	−63 23	210 05	S.	−13 00	E.N.E.		−6 07	−19 07			
			T.	−13 39	E. by N.		−6 40	−20 19			
			T.	−26 28	W.S.W.		+6 46	−19 42			
			T.	−21 32	S. by W. ¾ W.		+2 44	−18 48			
			S.	−23 31	S.S.W. ¼ W.		+3 27	−20 04			
			T.	−23 58	S. 42° W.		+5 10	−18 48			
			S.	−24 37	S.W.		+5 25	−19 12			
			S.	−26 46	S.W. by W. ½ W.	−77 36	+6 22	−20 24	−1 20	−20 44	
			T.	−21 44	S. 22° W.		+3 07	−18 37			
			T.	−24 23	S. 42° W.		+5 10	−19 13			
			T.	−23 43	S. 33° W.		+4 18	−19 25			
			S.	−23 21	S.W. by S.		+4 21	−19 00			
			T.	−25 01	S. 54° W.		+6 20	−18 41			
	−63 24	209 39	T.	−27 10	W.S.W.		+6 47	−20 23			
20 A.M.	−63 36	208 45	S.	−23 40	S.W. by S.		+4 39	−19 01			
			O.	−23 49	S.S.W.		+3 17	−20 32			
	−63 52	208 00	T.	−23 16	S. by W. ½ W.		+2 29	−20 47			
21 A.M.	−64 39	206 55	T.	−19 00	S. ½ E.		−0 50	−19 50			
	−64 48	206 18	S.	−18 26	S.S.E.		−3 17	−21 43			
			T.	−18 31	S. by E.	−78 30	−1 40	−20 11	−1 20	−22 00	
			W.	−18 08	S. by E. ½ E.		−2 29	−20 37			
			T.	−20 30	S.		0 0	−20 30			
			S.	−21 18	S.		0 0	−21 18			
	−64 49	206 10	R.	−25 18	S.W. by S.		+4 39	−20 39			
	−64 50	206 05	W.	−20 29	S. by E.		−1 40	−22 09			
			T.	−19 35	S. ½ E.		−0 51	−20 26			
			R.	−21 56	S. ¾ W.		+1 16	−20 40			
	−64 54	206 06	R.	−19 25	S. ½ E.		−1 16	−20 41			
	−64 56	206 04	R.	−18 54	S. by E.		−1 40	−20 34			
			R.	−22 38	S. 11° E.	−78 50	−1 36	−24 14	−1 20	−22 51	
			R.	−20 24	S. 9° E.		−1 18	−21 42			
			R.	−17 56	S. 8° E.		−1 09	−19 05			
			R.	−23 07	S. 11° E.		−1 36	−24 43			

Observations of Declination. (Continued.)

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Dec. 22 A.M.	−65 14	206 07	S.	−22 02	S. ¾ W.		+1 20	−20 42			
			O.	−24 24	S. by W. ½ W.		+2 38	−21 46			
	−65 13	205 55	T.	−22 14	S. by W.		+1 47	−20 27			
			S.	−22 39	S. by W.		+1 47	−20 52			
	−65 13	205 47	Y.	−22 02	S. by W.	−79 20	+1 47	−20 15	−1 20	−21 51	
			O.	−20 44	S. by W.		+1 47	−18 57			
			T.	−22 13	S. by W.		+1 47	−20 26			
			T.	−22 58	S. by W. ¼ W.		+2 14	−20 44			
	−65 16	206 00	W.	−23 00	S.S.W.		+3 28	−19 32			
			W.	−19 56	S.		0 0	−19 56			
	−65 21	206 08	R.	−22 43	S. ½ W.		+0 53	−21 50			
	−65 23	206 06	R.	−23 11	S. ½ W.		+0 53	−22 18			
22 P.M.		205 50	S.	−18 11	S.S.E.	−79 20	−3 28	−21 39	−1 20	−22 46	
	−65 38	205 47	T.	−21 14	S. ½ W.		+0 26	−20 48			
	−65 39	205 44	Y.	−22 02	S.		0 0	−22 02			
	−66 00	205 46	R.	−21 18	N. by E. ½ E.		−2 06	−23 24			
24 P.M.	−65 59	203 47	T.	−27 28	S.S.W.		+3 35	−23 53			
25 P.M.	−66 01	203 56	T.	−26 45	N.W. by N.	−79 45	+4 20	−22 25	−1 20	−24 13	
			T.	−14 34	S.E. by E. ½ E.		−7 50	−22 24			
27 A.M.	−66 16	203 44	S.	−14 42	E.S.E.		−8 10	−22 52			
28 A.M.	−66 17	203 36	S.	−16 17	E. by N. ½ N.		−8 02	−24 19			
			T.	−30 17	S.W. by S.		+5 17	−25 00			
			T.	−29 00	S.S.W. ½ W.		+4 28	−24 32			
			R.	−30 56	S.W.		+6 39	−24 17			
			W.	−30 50	S.W.		+6 39	−24 11			
29 A.M.	−66 24	203 51	W.	−31 36	W.N.W.	−80 00	+7 43	−23 53	−1 20	−25 36	
			T.	−31 41	W.N.W.		+7 43	−23 58			
			T.	−30 30	N.W. ½ W.		+6 18	−24 12			
29 P.M.	−66 25	203 51	S.	−17 13	E. by N. ½ N.		+8 02	−25 15			
			R.	−31 25	S.W. by W. ½ W.		+8 02	−23 23			
30 P.M.	−66 31	203 06	T.	−30 38	S.W.		+6 39	−23 59			
1842.											
Jan. 6 P.M.	−66 04	203 17	R.	−26 58	S. ¼ W.		+0 28	−26 30			
			Sm.	−26 38	S. ½ W.		+0 56	−25 42			
			R.	−28 16	S. by W. ¼ W.		+2 20	−25 56			
			Sm.	−28 38	S. by W. ½ W.	−79 56	+2 46	−25 52	−1 20	−26 59	
			R.	−23 42	N. by E.		−1 33	−25 14			
			R.	−27 26	N. by W. ¼ W.		+1 54	−25 32			
			T.	−27 14	N. by W. ½ W.		+2 16	−24 58			
	−66 05	203 13	T.	−30 55	N.W. ¼ N.		+6 26	−25 29			
7 P.M.	−66 20	204 19	T.	−32 04	N.W. ½ W.		+6 07	−25 57			
				−32 41	N.W. ½ W.		+6 07	−26 37			
8 P.M.	−66 14	204 48	R.	−32 34	S.W. by W.	−79 45	+7 31	−25 03	−1 20	−26 36	
	−66 15	204 50	R.	−16 07	E. by S.		−8 28	−24 35			
			R.	−33 01	S.W. by W.		+7 31	−25 30			
		204 49	R.	−28 21	S.S.W. ½ W.		+4 26	−23 56			
9 A.M.	−66 12	204 26	Sm.	−16 58	E.		−8 25	−25 23			
			O.	−16 49	S.E. by E. ½ E.		−7 55	−24 44			
	−66 15	204 26	S.	−16 50	E. by S. ½ S.		−8 24	−25 14			
		204 23	T.	−31 46	S.W.		+6 33	−25 13			
			O.	−30 14	S.W. ½ S.	−79 52	+5 54	−24 20	−1 20	−25 55	
			S.	−17 09	E. ½ S.		−8 26	−25 35			
			T.	−15 31	E. by S. ½ S.		−8 24	−23 55			
			Y.	−15 38	E. ½ S.		−8 26	−24 04			
			W.	−14 22	E. by S. ½ S.		−8 24	−22 46			
	−66 16	204 24	T.	−16 12	E. by S. ½ S.		−8 24	−24 36			

Observations of Declination. (Continued.)

1842.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Jan. 9 P.M.	−66 05	204 22	T.	−30 35	S.W. ½ S.		+5 54	−24 42			
			R.	−32 12	W.S.W.		+8 15	−23 57			
			T.	−31 41	S.W. ½ W.		+7 04	−24 37			
			T.	−33 36	W. by S. ½ S.		+8 28	−25 08			
			T.	−31 17	S.W. ½ W.		+6 48	−24 29			
			S.	−30 16	S.W.		+6 33	−23 43			
	−66 03	204 25	T.	−15 20	S.E. by E. ½ E.		−7 55	−23 15			
			T.	−16 04	E. by S. ½ S.	−79 52	−8 24	−24 28	−1 20	−25 48	
	−66 04	204 17	R.	−17 33	S.E. ½ S.		−6 14	−23 47			
		204 14	R.	−32 25	S.W. by W. ¾ W.		+8 05	−24 20			
			T.	−32 10	S.W. by W.		+7 35	−24 35			
			R.	−16 55	S.E. by E. ½ E.		−8 05	−25 00			
	−66 06	204 11	T.	−17 02	S.E. by E.		−7 35	−24 37			
			R.	−33 07	S.W. by W. ½ W.		+7 55	−25 12			
			SM.	−33 10	W.S.W.		+8 15	−24 55			
			R.	−16 37	E. by N.		−8 15	−24 52			
10 A.M.	−66 00	204 08	S.	−17 38	S.E.		−6 28	−24 06			
			O.	−17 28	S.E. ½ E.		−6 44	−24 12			
			S.	−17 30	S.E. ½ E.		−6 44	−24 14			
	−65 58	204 11	T.	−15 30	E. by S.		−8 31	−24 01			
			Y.	−15 21	E. by S.		−8 31	−23 52			
			W.	−17 02	S.E. by E. ½ E.	−79 48	−7 50	−24 52	−1 20	−25 26	
			T.	−16 03	S.E. by E. ½ E.		−7 50	−23 53			
			T.	−31 55	W. by S. ½ S.		+8 18	−23 37			
			W.	−32 25	W.S.W.		+8 09	−24 16			
			Y.	−31 49	W.S.W.		+8 09	−23 40			
	−66 04	204 18	T.	−31 50	S.W. by W.		+7 31	−24 19			
10 P.M.	−65 58	204 14	R.	−16 36	S.E. by E.		−7 31	−24 07			
			T.	−15 49	S.E. by E. ¾ E.		−8 00	−23 49			
			T.	−32 23	W. by S.		+8 31	−23 52			
	−65 58	204 16	T.	−27 46	S.S.W.		+3 37	−24 09			
			O.	−32 16	S.W. by W.		+7 31	−24 45			
	−65 57		R.	−16 26	E. by S. ¼ S.		−8 25	−24 51			
			T.	−16 15	E. by S.	−79 48	−8 31	−24 46	−1 20	−25 24	
			T.	−31 12	S.W. by W.		+7 31	−23 41			
			W.	−32 18	S.W.		+6 28	−25 50			
			R.	−30 27	S.W. ¼ S.		+6 10	−24 17			
		204 13	R.	−29 31	S.W. ½ S.		+5 30	−24 01			
			R.	−30 14	S.W. ½ S.		+5 50	−24 24			
	−65 58	204 10	R.	−32 13	W. by S. ¾ S.		+8 18	−23 55			
11 A.M.	−66 01	203 51	SM.	−21 04	S. by E.		−1 52	−22 56			
	−65 56	203 44	Y.	−19 51	S.E. by S.		−5 12	−25 03			
			T.	−26 27	S. by W. ¼ W.		+2 16	−24 43			
			Y.	−27 21	N.N.W. ½ W.		+3 40	−23 41			
			T.	−31 34	N.W. by W. ¼ W.		+7 07	−24 27			
12 A.M.	−65 52	203 45	T.	−31 42	S.W. by W.		+7 31	−24 11			
			R.	−31 52	S.W. by W.		+7 31	−24 21			
			W.	−31 58	W. by S. ¾ S.	−79 48	+8 18	−23 40			
12 P.M.	−65 56	203 24	R.	−26 53	S.S.W.		+3 37	−23 16	−1 20	−24 58	
			T.	−27 00	S.S.W.		+3 37	−23 23			
			T.	−23 49	S.		0 0	−23 49			
			S.	−22 48	S.		0 0	−22 48			
		203 29	T.	−22 36	S. ¾ E.		−1 24	−24 00			
	−65 57	203 26	R.	−20 23	S. by E.		−1 52	−22 15			
14 A.M.	−66 10	202 50	SM.	−24 36	S. by W.		+1 52	−22 44			
			SM.	−22 06	S. ¾ E.	−79 43	−1 24	−23 30			
			T.	−15 17	E. by N. ¾ N.		−7 40	−22 57			

Observations of Declination. (Continued.)

1842.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Jan. 16 P.M.	−65 47	202 13	R.	−22 19				−22 19	−3 03		R
			R.	−26 36				−26 36	−0 05		H 169
			R.	−24 45	Observed			−24 45	−0 28	−25 15	H 167
			R.	−24 00	on ice.	.....	.....	−24 00	−1 20		CCL
			R.	−23 16				−23 16	−1 20		CCL
			R.	−22 58				−22 58	−1 20		CCH
28 P.M.	−67 39	204 24	T.	−29 56	N. by w. ¼ w.		+2 25	−27 31			
			T.	−19 02	S.S.E. ½ E.		−4 44	−23 46			
		204 28	R.	−36 04	w. by N. ¼ N.		+8 44	−27 20			
			T.	−17 30	E.N.E.		−8 13	−25 43			
	−67 40	204 27	T.	−17 42	E. ½ s.	−80 34	−9 12	−26 54	−1 20	−27 46	
			R.	−16 49	E. ½ s.		−9 12	−26 01			
			R.	−35 09	S.W. ¼ w.		+7 20	−27 49			
29 A.M.	−67 34	203 59	T.	−27 58	S. ½ w.		+1 00	−26 58			
			T.	−16 57	E. ¼ N.		−8 57	−25 54			
31 A.M.	−67 20	202 20	T.	−28 40	S. by w. ¼ w.		+3 00	−25 40			
	−67 21	202 02	T.	−28 20	S. ½ w.		+1 01	−27 19			
			R.	−25 59	S. ½ E.		−1 01	−27 00			
			T.	−26 30	S.		0 0	−26 30			
			T.	−22 51	S. by E. ¾ E.	−80 44	−3 28	−26 19	−1 20	−27 36	
			R.	−24 19	S. by E. ½ E.		−3 00	−27 19			
Feb. 1 P.M.	−67 19	201 56	T.	−20 23	S.S.E. ¼ E.		−4 45	−25 08			
			W.	−19 08	S.E. by S.		−5 42	−24 50			
			T.	−34 20	N.W. by w.		+7 27	−26 53			
			R.	−37 09	w. ⅛ N.		+9 09	−26 00			
			O.	−34 45	N.W. by w.		+7 27	−26 18			
			T.	−28 10	S. by W.		+2 02	−26 08			
			W.	−29 43	S. by W.	−80 44	+2 02	−27 41	−1 20	−28 12	
			R.	−29 29	N.N.W. ¼ w.		+3 26	−26 03			
			R.	−25 12	N. ½ E.		−0 50	−26 02			
		201 55	R.	−36 14	S.W ½ S.		+6 26	−29 48			
2 A.M.	−67 43	200 00	T.	−31 31	S.S.W.		+4 04	−27 27			
	−68 18	202 24	R.	−39 16	N.W.by W.¾W.		+7 55	−31 21			
	−68 17	202 32	T.	−39 48	W.S.W.		+9 19	−30 29			
3 A.M.	−68 04	199 45	W.	−21 19	S. by E. ⅛ E.		−2 34	−23 53			
	−68 03	199 47	T.	−21 36	S.S.E. ½ E.		−4 57	−26 33			
	−68 37	200 03	S.	−21 34	S.E. ½ S.		−6 36	−28 10			
			R.	−22 08	S.E. by S.		−5 51	−27 59			
	−68 41	199 54	R.	−23 06	S.E. ½ S.	−81 00	−6 13	−29 19	−1 20	−30 25	
			R.	−39 53	W. ⅜ S.		+9 42	−30 11			
			W.	−38 58	W. ⅜ S.		+9 42	−29 16			
			T.	−40 19	W. ⅜ S.		+9 42	−30 37			
			S.	−40 25	W. ⅜ S.		+9 42	−30 43			
			O.	−39 34	W. by S.		+9 42	−29 52			
	−68 44	199 50	R.	−40 56	W. by S. ⅛ S.		+9 30	−31 26			
4 A.M.	−68 49	199 42	Sm.	−24 47	S. by E. ⅛ E.		−3 20	−28 07			
	−68 50		T.	−29 49	S. ⅛ W.		+1 08	−28 41			
	−68 51		O.	−29 42	S. by E.		−2 16	−31 58			
	−68 46	199 48	W.	−37 01	N.N.W. ⅛ W.		+4 35	−32 26			
			W.	−35 15	N.W. ⅝ N.		+6 15	−29 00			
			R.	−35 57	N.W. ⅝ N.		+6 15	−29 42			
			T.	−35 54	N.W. ⅝ N.	−81 38	+6 15	−29 39	−1 20	−32 33	
	−68 45	199 53	R.	−34 23	N.N.W. ¾ W.		+5 03	−29 20			
	−68 44	199 46	T.	−32 17	N. by W.		+2 16	−30 01			
			R.	−33 05	N. by W. ⅛ W.		+2 22	−30 43			
			R.	−38 42	S.W. ⅛ S.		+7 07	−31 35			
			T.	−38 31	S.W. ⅛ S.		+7 31	−31 00			
	−68 45	199 50	R.	−35 32	S.S.W. ¼ W.		+4 52	−30 40			

Observations of Declination. (Continued.)

1842	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Feb. 8. A.M.	−70 07	186 36	S.	−27 52	S.S.E.		− 5 37	−33 29			
			T.	−26 51	S.S.E. ½ E.		− 6 51	−33 42			
			O.	−30 31	S. by E. ¼ E.		− 3 31	−34 02			
	−70 08	186 25	S.	−33 41	S.		0 0	−33 41			
			W.	−30 23	S. by E. ¼ E.	−83 39	− 3 31	−33 54	−1 20	−35 42	
			T.	−29 56	S. by E. ½ E.		− 4 12	−34 08			
		186 24	T.	−33 40	S. ¼ E.		− 0 43	−34 23			
8 P.M.	−70 34	185 47	R.	−32 55	S. by E.		− 2 54	−35 49			
			T.	−33 18	S. by E.		− 2 54	−36 12			
9 A.M.	−70 34	185 33	T.	−52 48	W. ½ N.		+14 29	−38 19			
			W.	−50 28	W. by N.		+14 15	−36 13			
9 P.M.	−70 30	185 25	R.	−50 00	W. ½ N.		+14 29	−35 31			
	−70 38	185 26	O.	−52 27	W. ¼ S.		+14 40	−37 47			
	−70 33	185 20	R.	−51 21	W. ¼ S.		+14 41	−36 20			
			T.	−51 05	W. ¼ S.	−84 00	+14 41	−36 24	−1 20	−38 21	
			W.	−52 05	W. ¼ N.		+14 36	−37 29			
			T.	−50 17	W. ¼ N.		+14 36	−35 41			
	−70 31	185 13	R.	−51 58	W. ¼ S.		+14 41	−37 17			
			T.	−52 43	W.		+14 43	−38 00			
			R.	−52 35	W. ¾ N.		+14 22	−38 13			
	−70 26	185 05	R.	−53 52	W. ½ N.		+14 18	−39 34			
			T.	−51 49	W. ½ N.		+14 11	−37 38			
			R.	−51 12	W. ½ N.		+14 11	−37 01			
	−70 25	185 00	S.	−54 00	W.		+14 25	−39 35			
10 A.M.	−70 22	184 17	T.	−49 11	W. ½ S.	−83 52	+14 22	−34 49	−1 20	−37 35	
			Sm.	−49 13	W.		+14 25	−34 48			
			T.	−49 48	W. ½ N.		+14 11	−35 37			
	−70 20	184 10	Sm.	−49 51	W. ¾ S.		+14 20	−35 31			
			T.	−47 56	W. by S. ¾ S.		+13 50	−34 06			
	−70 16	183 54	O.	−46 47	S.W. by W. ½ W.		+12 59	−33 48			
			S.	−47 11	W.S.W.		+13 34	−33 37			
			T.	−47 05	S.W. by W. ½ W.		+12 57	−34 08			
			S.	−50 09	W. by S. ½ S.		+13 54	−36 15			
10 P.M.	−70 11	183 52	R.	−27 10	S.E. by S.		− 8 24	−35 34			
	−70 13	183 51	R.	−26 53	S.E.		−10 37	−37 30			
	−70 12	183 50	O.	−50 12	W. by S.	−83 50	+14 13	−35 59	−1 20	−36 28	
			T.	−48 52	W. by S.		+14 13	−34 39			
			R.	−48 27	W. ½ S.		+14 16	−34 11			
			T.	−49 13	W. ¼ N.		+14 12	−35 01			
			W.	−47 54	W. ½ N.		+14 05	−33 49			
	−70 14	183 54	T.	−49 53	W. ¼ N.		+14 12	−35 41			
13 A.M.	−72 10	180 58	S.	−30 58	S.E.	−85 07	−13 19	−44 17	−1 20	−45 37	
16 A.M.	−75 08	173 20	T.	−55 14	S.E. ¾ S.		−19 18	−74 32			
			R.	−56 11	S.E. ½ S.	−87 10	−20 33	−76 44	−1 20	−77 17	
	−75 03	173 03	T.	−56 01	S.E. ½ S.		−20 33	−76 34			
18 P.M.	−76 48	182 33	T.	−85 00	N.		0 0	−85 00			
			R.	−84 09	N. ¼ E.		− 2 39	−86 48			
			S.	−88 09	N.		0 0	−88 09	−1 20	−86 23	
			T.	−84 23	N.	−86 50	0 0	−84 23			
			W.	−90 46	N. by W. ¼ W.		+ 7 53	−82 53			
	−76 47	182 33	R.	−80 25	N. ½ E.		− 2 39	−83 04			
22 A.M.	−76 21	194 43	T.	−63 58	S.E. ¾ S.		−12 25	−76 23			
	−76 29		O.	−72 18	S.S.E. ½ E.		− 9 49	−82 07			
			S.	−70 54	S.S.E.		− 8 03	−78 57			
			T.	−71 09	S. by E. ½ E.		− 6 05	−77 14			
	−76 32	194 39	T.	−68 08	S.S.E. ½ E.	−85 26	− 9 00	−77 08	−1 20	−79 57	
			W.	−72 15	S. by E.		− 4 05	−76 20			
	−76 58	194 35	R.	−59 41	E. by S.		−20 00	−79 41			
	−76 57	194 28	T.	−59 00	E. by S.		−20 00	−79 00			
			R.	−59 18	E. by S.		−20 00	−79 18			
			R.	−59 57	E. by S.		−20 00	−79 57			

Observations of Declination. (Continued.)

1842.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	°	°		° ′		° ′	° ′	° ′	° ′	° ′	
Feb. 23 A.M.	−77 45	198 16	T.	−96 30	S.S.W.		+ 7 08	−89 22			
			O.	−96 31	S.S.W. ½ W.		+ 8 43	−87 48			
			S.	−96 05	S.S.W.		+ 7 08	−88 57			
			T.	−93 06	S.S.W.		+ 7 08	−85 58			
			O.	−93 39	S.W. by S.		+10 19	−83 20			
	−77 42	198 00	T.	−94 06	S.S.W. ½ W.	−85 00	+ 8 43	−85 23	−1 20	−88 08	
			S.	−94 02	S.W. by S.		+10 19	−83 43			
			W.	−98 12	S.W. by S.		+10 19	−87 53			
			T.	−99 25	S.W. by S.		+10 19	−89 06			
	−77 50	197 54	W.	−98 09	S.W. ½ S.		+11 41	−86 28			
23 P.M.	−77 48	197 03	R.	−69 54	E. ½ S.		−17 41	−87 35			
	−77 56	197 40	T.	−69 07	E. ½ S.		−17 39	−86 46			
	−78 00	197 26	R.	−70 06	E. by S.		−17 37	−87 43			
			T.	−68 51	E. ¾ S.		−17 39	−86 30			
	−78 02	197 24	S.	−70 14	E.		−17 46	−88 00			
	−78 07	197 34	R.	−67 13	E. ½ S.	−85 00	−17 41	−84 54	−1 20	−87 31	
			T.	−66 56	E. ½ S.		−17 41	−84 37			
			S.	−68 23	E.		−17 46	−86 09			
	−78 10	197 43	R.	−67 53	E. ½ S.		−17 41	−85 34			
			T.	−66 26	E. by S.		−17 37	−84 03			
25 A.M.	−75 13	193 50	T.	−82 32	W.		+17 46	−64 46			
			O.	−80 13	W.		+17 46	−62 27			
	−74 40	194 01	R.	−73 01	N.W.by W. ½ W.		+15 11	−57 50			
	−74 37	194 04	R.	−73 34	W.N.W.	−85 00	+16 05	−57 29	−1 20	−62 17	
	−74 25	194 04	T.	−76 47	W.N.W.		+16 05	−60 42			
		193 55	R.	−76 45	N.W. by W.		+14 17	−62 28			
27 P.M.	−71 59	186 42	T.	−57 42	S.W.by W. ½ W.		+14 00	−43 42			
	−71 54	186 30	R.	−57 40	S.W. by W.	−84 25	+13 40	−44 00	−1 20	−45 11	
28 A.M.	−71 11	185 03	T.	−52 06	S.W.by W. ½ W.		+13 51	−38 15			
	−71 09	184 58	S.	−50 45	W.S.W.		+14 30	−36 15			
			T.	−53 25	S.W.by W. ½ W.	−84 15	+13 51	−39 34	−1 20	−39 20	
	−71 05	184 45	T.	−53 20	W. ½ S.		+15 19	−38 01			
			R.	−53 16	W.		+15 23	−37 53			
Mar. 1 A.M.	−70 11	180 32	O.	−46 44	W.N.W.		+13 52	−32 52			
			T.	−45 32	W. by N. ½ N.		+14 22	−31 10			
			S.	−44 09	W.N.W.	−83 46	+13 52	−30 17			
	−70 10	180 29	T.	−46 02	W.N.W.		+13 52	−32 10			
			W.	−45 45	W.N.W.		+13 52	−31 53			
1 P.M.	−69 36	180 02	R.	−24 21	N. by E.		− 2 47	−27 08			
			S.	−24 00	N. by E.		− 2 47	−26 47	−1 20	−30 50	
			T.	−24 01	N. by E. ½ E.		− 4 10	−28 11			
			O.	−24 05	N. by E. ½ E.	−83 43	− 4 10	−28 15			
	−69 32	180 08	S.	−22 09	N.N.E. ½ E.		− 6 45	−28 54			
	−69 33	180 10	T.	−21 28	N.N.E. ½ E.		− 6 45	−28 13			
			R.	−21 20	N.N.E. ½ E.		− 6 45	−28 05			
2 A.M.	−68 50	182 38	W.	−22 58	N.N.E.		− 4 31	−27 29			
	−68 44	182 43	T.	−22 15	N.N.E.		− 4 31	−26 46			
			W.	−22 09	N.N.E.		− 4 31	−26 40			
	−68 40	182 53	T.	−23 34	N. by E. ½ E.		− 3 24	−26 58			
2 P.M.	−67 53	183 44	R.	−22 49	N. by E. ¾ E.		− 3 57	−26 46			
	−67 52		S.	−20 18	N.E. by N.	−82 23	− 6 34	−26 52	−1 20	−27 32	
	−67 49	184 05	T.	−17 56	N.E.		− 8 27	−26 23			
	−67 47	184 25	T.	−18 59	N.N.E. ½ E.		− 5 33	−24 32			
			R.	−19 10	N. by E. ¾ E.		− 3 57	−23 07			
			W.	−16 49	N.E.		− 8 27	−25 16			
			R.	−18 58	N.E. by N.		− 6 34	−25 32			
	−67 45	184 15	R.	−21 25	N.E. by N.		− 6 34	−27 59			

Observations of Declination. (Continued.)

1842.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
March 3 A.M.	−67 34	185 19	O.	−17 21	N.E. ½ E.	−82 00	− 8 41	−26 02			
	−67 28	185 39	R.	−18 06	N.E. ½ E.		− 8 41	−26 47	−1 20	−27 32	
5 A.M.	−67 20	187 56	T.	−16 16	E. by N.	−81 10	−10 23	−26 39			
			W.	−14 45	E. ½ N.		−10 35	−25 20			
6 A.M.	−65 27	191 35	Sm.	−19 52	N. by E.		− 1 34	−21 26			
	−65 21	191 45	T.	−21 59	N. ½ E.		− 0 47	−22 46			
6 P.M.	−65 00	192 42	T.	−21 38	N. ¾ E.		− 1 10	−22 48			
		192 40	W.	−20 48	N. by E.	−79 25	− 1 34	−22 22	−1 20	−23 40	
			T.	−20 15	N. by E.		− 1 34	−21 49			
			R.	−20 33	N. by E.		− 1 34	−22 07			
	−64 58	192 44	T.	−21 55	N. ¾ E.		− 1 10	−23 05			
7 P.M.	−63 33	194 53	R.	−15 05	S.E. ½ S.	−78 17	− 5 32	−20 37	−1 20	−21 57	
8 A.M.	−62 33	195 56	W.	−17 12	N. by E.		− 1 17	−18 29			
			T.	−19 19	N. ¾ E.		− 0 58	−20 17			
8 P.M.	−62 11	196 26	T.	−11 28	S.E.	−77 23	− 5 44	−17 12	−1 20	−19 51	
		196 29	T.	−15 05	N N.E. ½ E.		− 3 07	−18 12			
			R.	−15 53	N.N.E.		− 2 32	−18 25			
9 A.M.	−61 15	198 29	T.	−14 36	N.E. by N.		− 3 20	−17 56			
			Sm.	−13 54	N.E. by N.		− 3 20	−17 14			
9 P.M.	−60 54	199 40	W.	−12 25	N.E. ¼ E.		− 5 00	−17 25			
	−60 51	199 47	R.	−12 19	N.E. by E.	−76 09	− 5 12	−17 30	−1 20	−18 42	
			S.	−12 12	N.E. by E.		− 5 12	−17 23			
			W.	−14 24	N.E.		− 4 22	−18 46			
	−60 50	199 49	R.	−11 40	N.E. by E.		− 5 12	−16 52			
	−60 47	200 20	R.	−10 12	E.N.E.		− 6 00	−16 12			
10 A.M.	−60 34	202 42	S	−10 21	E.N.E.		− 5 30	−15 51			
			O.	−10 09	E.N.E.		− 5 30	−15 39	−1 20	−17 31	
	−60 32	203 08	T.	−11 10	E.N.E.	−74 15	− 5 30	−16 40			
10 P.M.	−60 18	206 10	T.	−10 34	E. by N.		− 6 00	−16 34			
12 A.M.	−60 17	212 56	S.	−10 54	E. by N.		− 5 34	−16 28			
			O.	− 9 58	E. by N.		− 5 34	−15 30	−1 20	−17 01	
			T.	− 8 29	E. by N. ½ N.	−73 55	− 5 20	−13 49			
	−60 13	213 07	S.	−11 19	E. by N.		− 5 34	−16 53			
14 P.M.	−59 15	219 01	T.	− 8 53	N.E.		− 3 37	−12 30			
			T.	− 8 33	N.E. by E.	−73 56	− 4 26	−12 59			
		219 14	T.	− 8 10	N.E. by E.		− 4 26	−12 36	−1 20	−15 30	
15 A.M.	−58 44	221 51	T.	−10 06	E. by N. ½ N.		− 5 10	−15 16			
			S.	−12 31	E.N.E.	−73 30	− 4 50	−17 21			
	−58 42	221 59	T.	− 9 23	E.N.E.		− 4 50	−14 13			
16 P.M.	−59 04	229 00	R.	−11 08	E. ½ S.		− 5 26	−16 34			
			S.	−11 15	E. ½ S.		− 5 26	−16 41	−1 20	−17 49	
			O.	−10 47	E. ½ S.	−73 00	− 5 26	−16 13			
			T.	−11 03	E. ½ S.		− 5 26	−16 29			
18 A.M.	−60 14	236 32	S.	−13 59	E.		− 5 24	−19 23			
			O.	−15 28	E.	−73 00	− 5 24	−20 52	−1 20	−20 56	
	−60 13	236 33	T.	−13 10	E.		− 5 24	−18 34			
20 P.M.	−59 17	245 40	R.	−14 40	E.N.E.	−71 33	− 4 14	−18 54	−1 20	−20 14	
22 A.M.	−58 40	251 52	T.	−15 41	E. by N.		− 4 29	−20 10			
			W.	−15 48	E. by N.	−70 51	− 4 29	−20 17	−1 20	−21 47	
			S.	−16 24	E. by N.		− 4 29	−20 53			
23 A.M.	−58 42	254 46	T.	−17 28	E. ½ N.		− 4 26	−21 54			
			W.	−17 40	E. ½ N.	−70 11	− 4 26	−22 06	−1 20	−23 28	
	−58 43	254 50	T.	−18 20	E.		− 4 35	−22 55			
23 P.M.	−58 38	255 34	R.	−17 58	N.E. by E. ½ E.		− 3 40	−21 38			
24 A.M.	−58 46	258 07	T.	−18 40	E.		− 4 29	−23 09			
			O.	−19 41	E. ½ N.	−69 46	− 4 21	−24 02	−1 20	−25 25	
			S.	−20 42	E. ½ N.		− 4 21	−25 03			

Observations of Declination. (Continued.)

1842.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Mar. 26 A.M.	−59 00	268 07	T.	−20 21	E. by N. ½ N.		−3 32	−23 53			
			W.	−21 51	E. by N. ½ N.		−3 32	−25 23			
		268 10	T.	−22 06	E. by N. ½ N.		−3 32	−25 38			
26 P.M.	−59 02	268 40	T.	−22 17	E.N.E.		−3 24	−25 41			
			R.	−22 10	E.N.E.	−67 38	−3 24	−25 34	−1 20	−26 17	
		268 45	T.	−21 40	E.N.E.		−3 24	−25 04			
			R.	−21 31	E.N.E.		−3 24	−24 55			
			O.	−20 32	E.N.E.		−3 24	−23 56			
		269 10	R.	−21 02	E.N.E.		−3 24	−24 26			
27 A.M.	−59 02	272 04	SM.	−22 15	E.N.E.	−67 00	−3 16	−25 31	−1 20	−26 51	
28 A.M.	−58 50	275 44	S.	−21 42	N.E. by E. ½ E.		−2 50	−24 32			
			O.	−21 37	N.E. by E. ½ E.		−2 50	−24 27			
			W.	−24 04	N.E. by E.	−65 30	−2 36	−26 40	−1 20	−26 18	
	−58 52	276 15	T.	−22 51	N.E. by E.		−2 36	−25 27			
	−58 54	276 53	R.	−21 06	N.E. by E.		−2 36	−23 42			
29 A.M.	−58 24	280 05	T.	−22 22	N.E. ½ E.		−2 15	−24 37			
29 P.M.	−58 20	280 34	R.	−20 55	N.E.		−2 02	−22 57			
	−58 19	280 31	T.	−22 12	N.E. ½ E.	−64 50	−2 15	−24 27	−1 20	−25 04	
			W.	−21 09	N.E. ½ E.		−2 15	−23 24			
		280 32	T.	−21 01	N.E. ½ E.		−2 15	−23 16			
30 A.M.	−58 30	282 07	T.	−22 52	E.N.E.		−2 47	−25 39			
			SM.	−23 19	N.E. by E. ½ E.		−2 35	−25 54			
			O.	−21 57	E.N.E.		−2 47	−24 44			
			S.	−21 46	E.N.E.		−2 47	−24 33			
			T.	−21 53	E.N.E.	−63 40	−2 47	−24 40	−1 20	−26 14	
	−58 29	282 01	S.	−22 24	N.E. by E.		−2 23	−24 47			
			W.	−20 46	E. by N. ½ N.		−2 58	−23 44			
			T.	−22 21	E.N.E.		−2 47	−25 08			
			S.	−22 09	N.E. by E.		−2 18	−24 27			
		282 22	T.	−23 34	N.E. ½ E.		−2 04	−25 38			
			S.	−21 39	N.E. ½ E.		−2 04	−23 43			
	−58 28	282 24	T.	−23 30	N.E. ½ E.	−63 00	−2 04	−25 34	−1 20	−26 18	
31 A.M.	−58 40	285 29	W.	−24 06	N.E. ½ N.		−1 36	−25 42			
			S.	−22 42	N.E. by N.		−1 23	−24 05			
	−58 32	285 30	T.	−24 02	N.E. ½ N.		−1 36	−25 38			
April 5 A.M.	−52 56	300 18	T.	−15 31	N.N.E.		−0 33	−16 04			
			R.	−15 26	N.N.E.	−53 54	−0 33	−15 59			
5 P.M.	−52 14	300 50	T.	−14 33	N. by E.		−0 16	−14 49	−1 20	−16 29	
6 A.M.	−51 50	301 43	T.	−12 06	E. by S.		−2 16	−14 22			
			T.	−12 32	E. by S.	−52 30	−2 16	−14 48			
			T.	−15 34	N.N.W. ½ W.		+0 38	−14 56			

Declinations observed on board Her Majesty's Ship Terror, between June 1841 and August 1842.

The Observers are distinguished in the column of Initials as follows:—C. Captain Crozier; P. Lieut. Phillips; Cr. Mr. Cotter, Master.

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination on.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
July 7.	−43 30	147 20	C.	− 9 37	S. 53° E.		− 4 18	−13 55			
			C.	− 9 39	S. 48° E.		− 4 01	−13 40			
			C.	− 9 08	S. 48° E.	−71 00	− 4 01	−13 09	+1 07	−12 35	Card F.
			C.	−10 05	S. 48° E.		− 4 01	−14 06			
9.	−42 23	149 31	C.	−14 45	N. 22° W.		+ 1 24	−13 21			
			C.	−15 09	N. 32° W.		+ 2 03	−13 06			
			Cr.	−14 07	N.N.W.	−69 50	+ 1 25	−12 42	+1 07	−11 49	
	−42 08	149 30	Cr.	−14 45	N.N.W.		+ 1 25	−13 20			
			Cr.	−13 37	N.N.W.		+ 1 25	−12 12			
10.	−40 56	149 20	C.	−11 57	N. 12° W.		+ 0 39	−11 18			
			C.	−13 03	N. 12° W.		+ 0 39	−12 24			
			C.	−14 35	N. 15° W.	−68 40	+ 0 58	−13 37	+1 07	−11 11	
			C.	−12 15	N. 12° W.		+ 0 39	−11 36			
	−40 33	149 26	Cr.	−12 55	N. ½ W.		+ 0 19	−12 36			
11.	−38 15	150 15	C.	−12 58	N.		0 00	−12 58			
			C.	−11 23	N. 15° W.		+ 0 50	−10 33			
	−37 47	150 21	C.	−12 50	N. 8° W.		+ 0 27	−11 23			
			C.	−11 28	N. 8° W.	−66 40	+ 0 27	−11 01	+1 07	−10 38	
			C.	−11 46	N. 17° W.		+ 0 56	−10 50			
			C.	−12 35	N. 15° W.		+ 0 50	−11 45			
			C.	−12 59	N. 12° W.		+ 0 37	−12 22			
			Cr.	−13 10	N.		0 00	−13 10			
12.	−37 25	151 25	C.	−10 38	N. 30° E.		− 1 31	−12 09			
			C.	− 9 55	N. 28° E.		− 1 23	−11 18			
			C.	−11 38	N. 36° E.		− 1 47	−13 25			
			C.	−10 27	N. 38° E.		− 1 53	−12 20			
			C.	−12 14	N. 32° E.	−66 00	− 1 37	−13 51	+1 07	−11 32	
			Cr.	−11 21	N.E. by N.		− 1 39	−13 00			
			Cr.	−11 06	N.E.		− 2 10	−13 16			
	−37 13	151 42	Cr.	−12 57	N.		0 00	−12 57			
13.	−36 17	151 50	C.	−12 47	N. 20° W.	−65 00	+ 1 00	−11 47			
			C.	−13 23	N. 20° W.		+ 1 00	−12 23			
Aug. 6.	−33 56	151 0	C.	−10 06	N. 82° E.		− 3 01	−13 07			
			C.	− 9 21	N. 85° E.	−62 40	− 3 05	−12 26	+1 07	−11 18	
			C.	− 9 03	N. 83° E.		− 3 02	−12 05			
			C.	− 9 42	N. 70° E.		− 2 21	−12 03			
8.	−33 25	160 45	C.	−13 21	N. 75° E.		− 2 45	−16 06			
			C.	−12 50	N. 70° E.	−61 30	− 2 35	−15 25			
			C.	−12 41	N. 76° E.		− 2 47	−15 28			
9.	−33 39	163 40	C.	−12 00	E.		− 2 56	−14 56			
			C.	−12 41	E.		− 2 56	−15 37	+1 07	−14 26	
			C.	−12 31	E.		− 2 56	−15 27			
			C.	−12 35	N. 79° E.	−60 40	− 2 43	−15 18			
			C.	−12 39	E.		− 2 56	−15 35			
			C.	−12 35	N. 85° E.		− 2 50	−15 25			
			Cr.	−13 14	E.		− 2 56	−16 10			
10.	−33 44	166 30	C.	−11 05	E.S.E		− 2 59	−14 04			
			C.	−13 11	S.E. by E.		− 2 50	−16 01			
			C.	−12 22	N. 82° E.		− 2 42	−15 04			
			C.	−13 07	E.		− 2 52	−15 59			
			C.	−11 59	E. by S. ½ S.		− 2 59	−14 58			
			C.	−12 23	E.S.E.		− 2 59	−15 22			
			C.	−13 25	S.E. ½ E.	−60 10	− 2 40	−16 05	+1 30	−13 40	Card B.

Observations of Declination. (Continued.)

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
Aug. 10.	−33° 44′	166° 30′	C.	−13° 11′	N. 70° E.	−60° 10′	−2° 04′	−15° 15′	+1° 30′	−13° 40′	
			C.	−14 20	N. 65° E.		−1 53	−16 13			
			C.	−13 12	N. 61° E.		−2 08	−15 20			
			C.	−11 15	S. 82° E.		−2 57	−14 12			
			C.	−13 13	N. 67° E.		−1 59	−15 12			
	−34 00	166 26	Cr.	−11 30	E. by N.		−2 39	−14 09			
			Cr.	−12 04	E.		−2 52	−14 56			
			Cr.	−11 33	E.S.E.		−2 59	−14 32			
			Cr.	−12 29	S.E. by E.		−2 50	−15 19			
11.	−33 32	167 35	C.	−14 56	N. 77° E.		−2 36	−17 32			
			C.	−14 34	E.		−2 49	−17 23			
			C.	−14 16	N. 73° E.		−2 27	−16 43			
			C.	−13 38	N. 78° E.		−2 36	−16 14			
			C.	−14 00	E.		−2 49	−16 49			
			C.	−12 41	S. 85° E.		−2 43	−15 24			
			C.	−13 28	N. 72° E.	−59 40	−2 25	−15 53	+1 30	−15 02	
			C.	−13 33	N. 72° E.		−2 25	−15 58			
			Cr.	−13 31	E.		−2 49	−16 20			
12.	−32 53	169 30	C.	−13 57	N. 56° E.		−1 56	−15 53			
			C.	−15 39	N. 53° E.		−1 50	−17 29			
			Cr.	−15 09	N.E.		−1 34	−16 43			
15.	−33 56	171 50	C.	−13 22	E. ½ S.		−2 43	−16 05			
			C.	−11 27	E. by S.		−2 47	−14 14			
16.	−34 20	172 45	C.	−13 53	E.		−2 40	−16 33			
			C.	−14 08	E.		−2 40	−16 48			
			C.	−16 20	N. 26° W.	−58 10	+0 46	−15 34	+1 30	−13 45	
			C.	−14 30	N. 38° W.		+1 15	−13 15			
			C.	−12 16	E.S.E.		−2 47	−15 03			
			Cr.	−15 30	N.W. by N.		+1 04	−14 26			
			Cr.	−12 34	E. by S.		−2 47	−15 21			
17.	−34 36	173 50	C.	−12 11	S. 83° E.		−2 45	−14 56			
			C.	−12 24	E. by S. ½ S.		−2 47	−15 11			
			C.	−13 20	E. by S. ½ S.	−58 10	−2 47	−16 07	+1 30	−13 42	
			C.	−11 38	E. by S. ½ S.		−2 47	−14 25			
	−34 17	173 35	Cr.	−12 35	E. by S.		−2 47	−15 22			
Nov. 24.	−36 17	177 12	Cr.	−13 51	E.S.E.	−59 40	−2 45	−16 36			
25.	−38 06	179 40	C.	−15 02	S.E. ½ E.		−2 30	−17 32			
			C.	−14 57	S.E. ½ E.		−2 30	−17 27			
			C.	−15 53	S.E.		−2 22	−18 15			
			Cr.	−14 50	S.E. by S.		−1 56	−16 46			
	−38 17	179 54	Cr.	−14 26	S.E. by E.	−60 15	−2 39	−17 05	+1 30	−14 55	
	−38 26	179 54	Cr.	−12 07	S.E. by E.		−2 39	−14 46			
	−38 23	179 54	C.	−13 23	S.E. by E.		−2 39	−16 02			
			C.	−11 33	S.E. by E.		−2 39	−14 12			
			C.	−12 50	S.E. by E. ½ E.		−2 43	−15 33			
26.	−39 03	182 33	Cr.	−13 59	E. by S.		−2 54	−16 53			
			C.	−13 18	S.E. by E. ½ E.		−2 48	−16 06			
			C.	−15 57	S.E.		−2 26	−18 23			
			C.	−15 47	S.E. by E. ½ E.	−61 00	−2 48	−18 35			
			Cr.	−14 19	S.E. by E.		−2 44	−17 03			
			Cr.	−13 43	E.S.E.		−2 53	−16 36	+1 30	−16 55	
			Cr.	−12 32	E.S.E.		−2 53	−15 25			
			Cr.	−13 22	E.S.E.		−2 53	−16 15			
28.	−40 38	183 05	C.	−18 06	S. by E.		−0 45	−18 51			
			C.	−15 51	S.E.	−62 00	−2 31	−18 22			
			Cr.	−16 32	S.E.		−2 31	−19 03			

Observations of Declination. (Continued.)

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Nov. 29.	−41 33	183 30	C.	−16 31	S.S.E.		− 1 30	−18 01			
			C.	−17 03	S.E. by S.		− 2 08	−19 11			
			C.	−16 45	S. by E.		− 0 47	−17 32			
			C.	−17 09	S. by E.		− 0 47	−17 56			
			Cr.	−16 08	S.		0 0	−16 08			
			Cr.	−17 09	S. by W.		+ 0 47	−16 22			
			Cr.	−14 51	S. by E.		− 0 47	−15 38			
			Cr.	−15 02	S.S.E.	−63 20	− 1 30	−16 32			
			Cr.	−14 53	S. by E.		− 0 47	−15 40			
			Cr.	−17 40	S.S.W.		+ 1 30	−16 10	+1 30	−15 13	
			Cr.	−18 41	S.W. by W.		+ 2 58	−15 43			
			Cr.	−18 32	S.W.		+ 2 38	−15 54			
			Cr.	−18 51	W.S.W.		+ 3 09	−15 42			
			Cr.	−18 51	S.W. by S.		+ 2 08	−16 43			
			Cr.	−14 42	S.E. by S.		− 2 08	−16 50			
30.	43 37	183 05	C.	−16 41	S. ¼ E.		− 0 25	−17 06			
			C.	−17 56	S. ½ W.	−65 00	+ 0 25	−17 31			
			Cr.	−15 53	S.		0 0	−15 53			
			Cr.	−17 17	S.		0 0	−17 17			
Dec. 1.	−45 29	183 10	Cr.	−14 58	S.E. by E.		− 3 22	−18 20			
			Cr.	−16 21	S.E. by E.	−66 30	− 3 22	−19 43			
2.	−47 09	184 30	C.	−15 40	E.S.E.		− 3 36	−19 16			
			C.	−14 54	S.E. by E. ¼ E.		− 3 29	−18 23			
	−47 37	185 00	C.	−12 59	S.E. ¼ E.		− 3 11	−16 10			
			C.	−12 50	S.E. ¼ E.		− 3 16	−16 06	+1 30	−15 17	
			C.	− 9 24	S.E. by E. ¾ E.	−67 55	− 3 33	−12 57			
			C.	−12 04	S.E. by E.		− 3 22	−15 26			
	−47 11	184 24	Cr.	−13 24	E.S.E.		− 3 36	−17 00			
	−47 33	184 54	Cr.	−13 09	S.E. by E.		− 3 22	−16 31			
			Cr.	−11 28	S.E. by E.		− 3 22	−14 50			
3.	−48 57	186 40	C.	−13 51	E. by S. ½ S.	−69 05	− 4 07	−17 58			
			C.	−14 20	S.E. ¾ E.		− 3 40	−18 00			
5.	−49 33	189 22	C.	−13 32	E. ¼ S.		− 4 16	−17 48			
			C.	−15 03	E. ¼ S.		− 4 16	−19 19	+1 30	−16 52	
			C.	−13 40	E.S.E.	−69 40	− 4 13	−17 53			
			C.	−13 36	E. ½ S.		− 4 13	−17 49			
	−49 33	188 54	Cr.	−15 27	E. by S.		− 4 19	−19 46			
6.	−49 57	191 10	C.	−15 09	E. ½ S.		− 4 15	−19 24			
			C.	−14 07	E. ½ S.		− 4 15	−18 22			
			C.	−12 35	E. ¼ S.		− 4 19	−16 54			
			C.	−12 44	E. ¼ S.	−69 37	− 4 19	−17 03	+1 30	−16 36	
			C.	−13 55	E. ½ S.		− 4 15	−18 10			
			C.	−13 49	E. ¼ S.		− 4 19	−18 08			
			Cr.	−14 21	E. by S.		− 4 18	−18 39			
7.	−50 53	192 30	Cr.	−15 02	S.E. by E.		− 3 56	−18 58			
			C.	−13 31	S.E. by E. ½ E.		− 4 06	−17 37			
			C.	−14 35	S.E. by E.		− 3 56	−18 31			
			C.	−15 00	S.E. ½ E.	−69 50	− 3 41	−18 41	+1 30	−16 37	
			C.	−14 59	S.E. by E.		− 3 56	−18 55			
			C.	−12 11	S.E. by E. ½ E.		− 4 06	−16 17			
			Cr.	−15 47	S.E. ½ E.		− 3 41	−19 28			
			Cr.	−12 14	E.S.E.		− 4 15	−16 29			
8.	−51 37	194 00	C.	−13 24	E. by S.		− 4 25	−17 49			
	−51 53	195 17	C.	−12 57	E. by S.		− 4 25	−17 22			
			C.	−12 00	E. by S.		− 4 25	−16 25			
			C.	−11 26	E.S.E.	−70 11	− 4 19	−15 43	+1 30	−15 14	
			C.	−12 15	E.S.E.		− 4 19	−16 34			
			C.	−11 50	E.S.E.		− 4 19	−16 09			
			C.	−13 02	E. by S.		− 4 25	−17 27			
			C.	−11 59	E. by S.		− 4 25	−16 24			

Observations of Declination. (Continued.)

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Dec. 9.	−52 27	198 14	CR.	−15 16	E.S.E.		− 4 20	−19 36			
12.	−53 03	204 50	C.	−12 10	E.S.E.		− 4 20	−16 30			
			C.	−11 33	S.E. by E. ½ E.		− 4 15	−15 58			
			C.	−10 32	E. by S. ⅔ S.		− 4 23	−14 55			
			C.	−10 52	E. by S. ⅔ S.		− 4 23	−15 15			
			C.	−11 00	E.S.E.	−70 15	− 4 20	−15 20	+1 30	−14 54	
	−53 18	205 46	C.	−11 32	E.S.E.		− 4 20	−15 52			
			C.	−12 32	E.S.E.		− 4 20	−16 52			
	−53 06	205 24	CR.	−12 11	E.S.E.		− 4 20	−16 31			
			CR.	−12 31	S.E. by E.		− 4 01	−16 32			
	−53 21	205 24	CR.	−12 42	E.S.E.		− 4 20	−17 02			
14.	−56 18	211 30	C.	−13 27	S.E. ½ E.		− 3 57	−17 24			
			C.	−12 37	S.E. ½ E.		− 4 13	−16 50			
			C.	−13 57	S.E.		− 3 49	−17 46			
			C.	−13 54	S.E. ½ S.		− 3 26	−17 20			
	−56 24	211 45	C.	−12 24	E.		− 4 43	−17 07			
			C.	−12 01	E. ½ N.		− 4 35	−16 36			
			C.	−21 03	S.W. ½ W.	−72 00	+ 3 57	−17 06	+1 30	−15 14	
			C.	−13 05	N.E. ½ N.		− 2 44	−15 49			
	−56 10	211 37	CR.	−13 15	S.E. by S.		− 3 03	−16 18			
			CR.	−12 34	S.E. by S.		− 3 03	−15 37			
			CR.	−11 19	S.E. by S.		− 3 03	−14 22			
	−56 29	211 50	CR.	−14 50	S.E. by S.		− 3 03	−17 53			
			CR.	−14 52	S.S.E.		− 2 09	−17 01			
			CR.	−13 15	S.E.		− 3 49	−17 04			
15.	−56 55	212 00	C.	−14 51	S.S.E. ½ E.		− 2 40	−17 31			
			C.	−13 35	S.E. ½ S.		− 3 31	−17 06			
			C.	−13 48	S.E. ⅔ S.		− 3 20	−17 08			
			C.	−13 42	S.E. ⅔ S.		− 3 20	−17 02			
	−57 09	212 26	C.	−15 01	S.S.E.		− 2 12	−17 13			
			C.	−13 59	S.S.E.	−72 30	− 2 12	−16 11	+1 30	−15 14	
			C.	−13 30	S.S.E. ¼ E.		− 2 25	−15 55			
			CR.	−13 39	S.S.E.		− 2 12	−15 51			
			CR.	−14 43	S.S.E.		− 2 12	−16 55			
			CR.	−14 15	S.S.E.		− 2 12	−16 27			
16.	−58 21	213 00	C.	−16 32	S. by E. ⅔ E.		− 2 06	−18 38			
			C.	−17 39	S. by E. ½ E.		− 1 31	−19 10			
			C.	−15 52	S.S.E.		− 2 23	−18 15			
			C.	−16 11	S. by E. ⅔ E.		− 2 06	−18 17			
			C.	−16 05	S.S.E.	−73 55	− 2 23	−18 28	+1 30	−17 34	
			C.	−15 42	S.S.E.		− 2 23	−18 05			
			CR.	−15 47	S.S.E.		− 2 23	−18 10			
			CR.	−18 43	S.S.E.		− 2 23	−21 06			
			CR.	−19 07	S.S.E.		− 2 23	−21 30			
17.	−60 28	213 40	CR.	−15 27	S.S.E.	−75 40	− 2 38	−18 05			
18.	−62 53	212 48	C.	−22 22	S. by W.		+ 1 29	−20 53			
			C.	−24 19	S. ½ W.		+ 0 44	−23 35			
			C.	−20 41	S. by E. ½ E.		− 1 52	−22 33			
			C.	−21 10	S. ½ E.		− 0 44	−21 54			
	−62 56	212 00	C.	−28 15	S.W. by W.		+ 5 54	−22 21			
			C.	−27 18	S.W. by W.		+ 5 54	−21 24			
			C.	−27 54	S.W. ½ W.		+ 5 44	−22 10	+1 30	−20 03	
			C.	−28 15	S.W. by W.	−76 50	+ 5 54	−22 21			
			C.	−27 49	S.W. by W. ½ W.		+ 6 11	−21 38			
			C.	−27 16	S.W.		+ 5 08	−22 08			
	−63 01	211 30	C.	−23 57	S.S.W. ½ W.		+ 3 32	−20 25			
			C.	−24 06	S.S.W.		+ 2 58	−21 08			
			C.	−24 02	S.S.W.		+ 2 58	−21 04			
	−62 56	212 00	CR.	−26 48	S.W.		+ 5 08	−21 40			

Observations of Declination. (Continued.)

1841.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Dec. 19.	−63 16	210 00	C.	−28 20	S.S.W. ½ W.		+ 4 02	−24 18			
			C.	−26 10	S.S.W. ½ W.		+ 3 27	−22 43			
	−63 23	209 40	C.	−31 10	W. by S. ½ S.		+ 6 54	−24 16			
			C.	−25 18	S. by W. ½ W.		+ 2 21	−22 57			
			C.	−23 47	S. ½ W.		+ 0 23	−23 24			
			C.	−21 21	S.		0 0	−21 21			
			C.	−28 21	W.S.W.		+ 6 47	−21 34			
			C.	−29 18	S.W.		+ 5 25	−23 53			
			C.	−26 15	S.S.W. ½ W.	−77 36	+ 3 46	−22 29	+1 30	−20 56	
			C.	−25 04	S.S.W.		+ 3 08	−21 56			
			C.	−27 23	S.W. ½ W.		+ 5 38	−21 45			
	−63 17	210 14	CR.	−24 51	S.W. by S.		+ 4 20	−20 31			
			CR.	−25 00	S. 18° W.		+ 2 35	−22 25			
			CR.	−27 16	S. 40° W.		+ 4 52	−22 24			
	−63 23	209 40	CR.	−27 06	S.S.W.		+ 3 08	−23 58			
			CR.	−28 50	S. 78° W.		+ 7 02	−21 48			
			CR.	−26 45	S. 78° W.		+ 7 02	−19 43			
21.	−64 48	206 10	C.	−22 59	S. by E. ½ E.		− 2 04	−25 03			
			C.	−22 36	S.S.E.		− 3 17	−25 53			
			C.	−25 09	S. ½ W.		+ 0 25	−24 44			
			C.	−24 11	S. ½ E.		− 1 15	−25 26			
			C.	−28 03	S.S.W.	−78 30	+ 3 17	−24 46	+1 30	−22 55	
			C.	−23 49	S.		0 0	−23 49			
			C.	−26 53	S. by W. ½ W.		+ 2 28	−24 25			
			C.	−23 09	S. ½ E.		− 0 50	−23 59			
			C.	−20 51	S. ½ E.		− 0 50	−21 41			
22.	−65 21	205 20	C.	−25 11	S.		0 0	−25 11			
			C.	−25 56	S.		0 0	−25 56			
			C.	−27 31	S. ½ W.	−79 20	+ 1 20	−26 11			
			CR.	−27 12	S. by W.		+ 1 48	−25 24	+1 30	−24 27	
			CR.	−27 32	S.		0 0	−27 32			
24.	−65 58	204 00	C.	−26 57	S. by W. ½ W.	−79 40	+ 2 42	−24 15			
1842.			CR.	−31 30	S.S.W. ½ W.		+ 4 19	−27 11			
Jan. 6.	−66 10	203 37	C.	−23 15	N.E. ½ N.		− 5 26	−28 41			
			C.	−29 29	S.		0 0	−29 29			
			C.	−27 27	S. ½ E.		− 0 57	−28 24			
			C.	−27 10	S. ½ E.	−79 56	− 1 25	−28 35	+1 07	−27 24	Card F.
			C.	−28 02	S. ½ E.		− 0 28	−28 30			
			C.	−29 38	S. by W.		+ 1 54	−27 44			
			CR.	−31 14	N.N.W.		+ 3 00	−28 14			
9.	−66 02	204 00	C.	−34 06	S.W. ½ S.		+ 6 14	−27 52			
			C.	−20 52	E.S.E.		− 8 14	−29 06			
			C.	−34 46	S.W. by W. ½ W.		+ 7 58	−26 48			
			C.	−20 09	E. ½ S.		− 8 32	−28 41			
			C.	−34 42	S.W. ½ S.		+ 5 54	−28 48			
			C.	−35 52	W. by S.		+ 8 32	−27 20			
			C.	−23 47	S.E. by S.		− 5 13	−29 00			
			C.	−20 29	S.E. ½ E.		− 7 18	−27 47			
			C.	−33 58	S.W. ½ W.	−79 52	+ 7 18	−26 40	+1 07	−26 48	
			C.	−21 37	S.E. ½ E.		− 7 18	−28 55			
			C.	−33 55	S.W. ½ W.		+ 7 18	−26 37			
			C.	−34 19	S.W. ½ W.		+ 7 18	−27 01			
			C.	−20 34	S.E. ½ E.		− 7 18	−27 52			
			CR.	−34 41	S.W.		+ 6 34	−28 07			
			CR.	−19 20	E.S.E.		− 8 14	−27 34			
			CR.	−34 20	S.W. ½ W.		+ 7 03	−27 17			
			CR.	−19 35	E. ½ S.		− 8 32	−28 07			
			CR.	−20 54	S.E. by E. ½ E.		− 8 04	−28 58			

Observations of Declination. (Continued.)

1842.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
Jan. 10.	−65° 58′	203° 54′	C.	−19° 32′	E. by N.	° ′	−8 13	−27 45	° ′	° ′	
			C.	−34 59	W. by S.		+8 31	−26 28			
			C.	−18 30	E. ¼ S.		−8 31	−27 01			
			C.	−33 40	S.W. by W. ¼ W.		+7 44	−25 56			
			C.	−34 14	S.W. ¾ W.		+7 20	−26 54			
			C.	−33 09	S.W. ½ W.	−79 48	+7 35	−25 34	+1 07	−25 00	
			C.	−32 30	S.W. ½ S.		+7 02	−25 28			
			C.	−30 16	S.S.W. ¼ W.		+4 01	−26 15			
			C.	−33 04	S.W. by W.		+7 34	−25 30			
			C.	−32 47	W. by S.		+8 32	−24 15			
			C.	−31 04	S.S.W. ¾ W.		+4 48	−26 16			
			C.	−32 00	S.S.W. ¾ W.		+4 48	−27 12			
			CR.	−23 04	S.E. ½ S.		−7 02	−30 06			
			CR.	−34 10	W.S.W.		+8 12	−25 58			
			CR.	−19 17	S.E.		−6 32	−25 49			
			CR.	−16 56	S.E. by E.		−7 34	−24 30			
			CR.	−19 00	E.S.E.	−79 48	−8 12	−27 12	+1 07		
			CR.	−19 31	E.S.E.		−8 12	−27 43			
			CR.	−18 33	E. by S.		−8 31	−27 04			
			CR.	−21 18	S.E.		−6 32	−27 50			
			CR.	−19 20	E. by N.		−8 13	−27 33			
			CR.	−18 52	E.S.E.		−8 12	−27 04			
11.	−65 57	203 40	C.	−28 13	N. ¾ W.		+1 09	−27 04			
			C.	−34 41	W. by S. ½ S.		+8 21	−26 20			
			C.	−29 53	S. ¼ W.		+1 26	−28 27			
			C.	−30 13	S. by W. ⅓ W.		+2 44	−27 29			
			CR.	−26 44	S.		0 0	−26 44			
			CR.	−26 45	S.		0 0	−26 45			
12.	−65 46	203 22	CR.	−35 16	S.W.		+6 32	−28 44			
			CR.	−38 22	S.W. by W.	−79 48	+7 34	−30 48	+1 07	−26 24	
13.	−66 10	202 40	C.	−26 00	S. ¼ E.		−1 26	−27 26			
			C.	−23 36	S. by E.		−1 52	−25 28			
			CR.	−25 26	S.		0 0	−25 26			
14.	−66 00	202 30	C.	−26 13	S. by E. ½ E.		−2 44	−28 57			
			C.	−28 28	S. ½ W.		−0 55	−27 33			
			C.	−20 54	E.N.E.		−7 34	−28 28			
			C.	−20 30	N.E. by E.		−6 42	−27 12			
28.	−67 40	204 10	CR.	−30 54	S. ½ W.		+1 01	−29 53			
			CR.	−29 04	S. ¾ E.		−1 30	−30 34			
			C.	−31 48	S. ¾ W.		+1 30	−30 18			
			C.	−26 53	N. ½ E.		−0 50	−27 43			
			C.	−33 38	N.W. ¼ N.	−80 34	+5 52	−27 46	+1 07	−28 19	
			C.	−36 47	S.W. ½ S.		+6 38	−30 09			
			C.	−35 19	S.W. by S.		+5 36	−29 43			
			C.	−34 15	S.S.W.		+3 53	−30 22			
			C.	−19 11	E. ⅔ S.		−9 14	−28 25			
29.	−67 36	204 00	CR.	−21 47	E. by S.	−80 40	−9 20	−31 07			
			CR.	−35 06	S.S.W. ¼ W.		+4 20	−30 46			
31.	−67 16	202 10	C.	−32 27	S.S.W.		+3 57	−28 30			
			C.	−26 24	S. by E. ½ E.		−2 58	−29 22			
			C.	−31 53	S. ½ W.		+1 02	−30 51			
			C.	−31 04	S. ¾ W.		+1 33	−29 31	+1 07	−28 37	
			C.	−29 03	S. ½ W.	−80 45	+1 02	−28 01			
			C.	−31 39	S. by W.		+2 01	−29 38			
			C.	−32 19	S. ¾ W.		+1 33	−30 46			
	−67 13	202 35	CR.	−34 04	S.S.W. ¼ W.		+4 20	−29 44			
			CR.	−32 40	S.S.W.		+3 57	−28 43			

Observations of Declination (Continued.)

1842.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Feb. 1.	−67 20	201 40	C.	−27 52	S.S.E.		− 3 57	−31 49			
			C.	−34 23	N. 72° W.		+ 8 45	−25 38			
			C.	−26 02	S. 27° E.		− 4 51	−30 53			
			C.	−31 38	N. 25° W.		+ 3 46	−27 52			
			C.	−35 59	N. 50° W.		+ 6 50	−29 09			
			C.	−30 21	S. 5° E.	−80 45	− 1 00	−31 21	+1 07	−28 33	
			C.	−30 44	S. 5° E.		− 1 00	−31 44			
			C.	−26 52	N. 15° E.		− 2 20	−29 12			
			C.	−30 20	N. 14° W.		+ 2 11	−28 09			
			CR.	−37 20	W.		+ 9 25	−27 55			
			CR.	−28 37	S.S.E.		− 3 57	−32 34			
2.	−67 46	200 12	CR.	−37 55	S.S.W.		+ 4 04	−33 51			
3.	−68 06	199 40	C.	−28 02	S.S.E. ½ E.		− 4 57	−32 59			
	−68 40	200 00	C.	−29 23	S.E.		− 7 22	−36 45			
			C.	−31 03	S.E. ½ E.		− 7 39	−38 42			
			C.	−28 10	S.E. ¼ S.		− 6 36	−34 46			
			C.	−44 56	W. by S.		+ 9 42	−35 14			
			C.	−44 26	W.S.W.	−81 00	+ 9 19	−35 07	+1 30	−32 43	Card R.
			C.	−43 50	W.S.W.		+ 9 19	−34 31			
			C.	−42 51	W. by S. ½ S.		+ 9 30	−33 21			
			C.	−42 07	W. by S.		+ 9 42	−32 25			
	−67 58	199 50	C.	−41 14	W. by S.		+ 9 42	−31 32			
			CR.	−26 59	S.S.E.		− 4 04	−31 03			
			CR.	−30 29	S.S.E.		− 4 04	−34 33			
4.	−68 52	199 40	C.	−40 55	N.W. ¼ W.		+ 7 20	−33 35			
			C.	−38 40	N.W. ½ N.		+ 5 52	−32 48			
			C.	−38 46	N.W. ¼ N.		+ 6 38	−32 08			
			C.	−34 27	N.W. ½ N.	−81 38	+ 5 52	−28 35	+1 30	−30 47	
			C.	−36 02	N.N.W. ½ W.		+ 5 03	−30 59			
			C.	−40 17	S.W. by S.		+ 6 19	−33 58			
			C.	−38 50	S.S.W. ½ W.		+ 4 51	−33 59			
8.	−70 06	186 20	C.	−37 51	S. ¾ E.		− 2 08	−39 59			
			C.	−37 00	S. by E. ¼ E.	−83 30	− 4 53	−41 53			
			C.	−37 30	S. ½ E.		− 1 25	−38 55			
			CR.	−37 06	S. ¾ E.		− 2 08	−39 14			
9.	−70 40	185 40	C.	−53 35	W.		+14 43	−38 52			
	−70 36	185 10	C.	−57 49	W. ¾ S.		+14 38	−43 11	+1 30	−38 55	
			C.	−55 20	W. ½ S.		+14 40	−40 40			
			C.	−54 51	W.		+14 43	−40 08			
			C.	−55 48	S. 85° W.		+14 41	−41 07			
			C.	−54 57	S. 85° W.		+14 40	−40 17			
			C.	−55 05	W. ¾ S.		+14 38	−40 27			
			C.	−54 54	W. ¾ S.		+14 38	−40 16			
			C.	−56 07	W.		+14 43	−41 24			
			C.	−53 58	N. 70° W.	−84 00	+13 31	−40 27			
			C.	−55 06	S. 78° W.		+14 15	−40 51			
	−70 22	185 00	C.	−53 56	W.		+14 43	−39 13			
			C.	−53 02	W. by N.		+14 15	−38 47	+1 30	−38 17	
	−70 40	185 40	CR.	−51 03	W.N.W.		+13 16	−37 47			
			CR.	−52 21	W. by N.		+14 15	−38 06			
	−70 36	185 10	CR.	−49 34	W.		+14 43	−34 51			
			CR.	−56 21	W.		+14 43	−41 38			
			CR.	−56 14	W. ½ N.		+14 30	−41 44			
			CR.	−53 30	W.N.W.		+13 16	−40 14			

Observations of Declination. (Continued.)

1842.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
				° ′		° ′	° ′	° ′	° ′	° ′	
Feb. 10.	−70 14	184 00	C.	− 53 45	W.		+14 07	−39 38			
			C.	− 51 09	S.W. by W. ½ W.		+13 03	−38 06			
			C.	− 28 40	S.E. ½ E.		−10 54	−39 34			
			C.	− 28 57	S.E. by E.		−12 05	−41 02			
			C.	− 29 12	S.E. by E.		−12 05	−41 17			
			C.	− 54 07	W. by S. ½ S.		+13 42	−40 25			
			C.	− 52 41	W. ¾ S.		+14 04	−38 37			
			C.	− 52 44	W. by S.		+14 02	−38 42			
			C.	− 51 25	W. ¼ S.	−83 45	+14 05	−37 20	+1 30	−37 19	
			C.	− 50 32	W. by S.		+14 02	−36 30			
			C.	− 50 33	W.N.W.		+12 43	−37 50			
			C.	− 37 01	N. ½ E.		− 1 17	−38 18			
			C.	− 38 12	N. by W.		+ 2 34	−35 38			
			Cr.	− 29 28	S.E. by S.		− 8 17	−37 45			
			Cr.	− 28 15	S.E. ½ E.		−11 17	−39 32			
			Cr.	− 53 43	W. ½ S.		+14 05	−39 38			
			Cr.	− 54 05	W. by S.		+14 02	−40 03			
12.	−71 04	180 46	C.	− 30 39	S.E. ¼ S.		−11 16	−41 55			
			C.	− 29 45	S.E.		−11 53	−41 38			
			C.	− 31 59	S.E. by S.	−84 30	− 9 24	−41 23	+1 30	−40 45	
			C.	− 32 18	S.E. ¾ S.		−10 00	−42 18			
			Cr.	− 32 09	S.E.		−11 53	−44 02			
14.	−73 14	181 08	C.	− 37 39	S. 42° E.		−15 24	−53 03			
			Cr.	− 39 01	S.E. ½ S.	−86 00	−14 32	−53 33	+1 30	−51 48	
16.	−75 04	173 20	C.	− 59 26	S.E. by S.		−18 03	−77 29			
			C.	− 40 57	S.E. by E.	−87 00	−27 15	−68 12			
17.	−76 04	176 00	C.	− 56 12	E. ¼ N.		−30 03	−86 15	+1 30	−76 03	
			C.	− 56 34	N.E. by E.	−87 00	−24 47	−81 21			
			C.	− 58 13	N.E. ¼ E.		−23 47	−82 00			
18.	−76 54	182 17	C.	− 80 43	N. ¼ E.		− 1 19	−82 02			
			C.	− 75 23	N. ¼ W.	−86 50	+ 1 19	−74 04*	+1 30	−82 28	
			C.	− 74 51	S. 25° E.		−13 23	−88 14			
			C.	− 75 01	N. by E. ¼ E.		− 6 36	−81 37			
20.	−76 12	191 40	C.	− 58 32	N.E.		−15 00	−73 32			
			C.	− 51 19	N.E. by E. ½ E.	−85 55	−18 53	−70 12	+1 30	−70 22	
22.	−76 32	194 40	C.	− 72 15	S.S.E. ½ E.		− 8 47	−81 02			
			C.	− 74 30	S.S.E.		− 7 54	−82 24			
			C.	− 72 24	S.E. by S.		−11 26	−83 50			
	−77 00		C.	− 60 26	E.S.E.		−18 42	−79 08			
			C.	− 72 10	E.S.E.	−85 30	−18 42	−90 52	+1 30	−81 23	
			C.	− 65 19	E.S.E.		−18 42	−84 01			
	−76 32		C.	− 72 44	S.S.E. ½ E.		− 8 47	−81 31			
	−77 00		C.	− 60 43	E. by S.		−19 36	−80 19			
23.	−78 00	198 32	C.	−110 25	W. by N. ¾ N.		+18 19	−92 06			
	−77 55	197 48	C.	− 70 48	E. ½ S.		−19 42	−90 30			
			C.	− 69 12	E. ½ S.		−19 42	−88 54			
			C.	− 70 07	E. ½ S.	−85 30	−19 42	−89 49	+1 30	−88 01	
			C.	− 70 25	E. ½ S.		−19 42	−90 07			
			C.	−108 56	W. ½ N.		+19 33	−89 23			
			C.	−103 22	W.N.W.		+17 59	−85 23			
	−78 04		Cr.	− 70 09	E. by S.		−19 46	−89 55			
24.	−77 32	200 00	Cr.	− 95 35	N.W.		+12 05	−83 30			
25.	−75 22	194 00	C.	− 84 54	W. ½ N.		+17 30	−67 24			
	−74 31	193 50	C.	− 79 11	N. 75° W.	−85 00	+16 57	−62 14	+1 30	−64 33	
			Cr.	− 71 00	N.W.		+12 05	−58 55			
			Cr.	− 56 32	N. ½ E.		− 1 38	−58 10			
28.	−71 00	184 10	C.	− 56 04	W.		+14 43	−41 21			
			C.	− 55 15	W. ¼ N.	−84 00	+14 29	−40 46	+1 30	−38 26	
	−70 54	183 50	Cr.	− 52 17	W. by S.		+14 37	−37 40			

* Doubtful; omitted in the mean.

Observations of Declination. (Continued.)

1842.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
Mar. 1.	−70 10	180 20	C.	−46 03	W. by N. ½ N.	° ′	+ 14 23	−31 40	° ′	° ′	
			C.	−48 05	W.N.W.	−83 45	+ 13 52	−34 13	+1 30	−31 26	
			Cr.	−47 46	W. by N.		+ 14 52	−32 54			
2.	−67 54	183 40	C.	−26 18	N.N.E.		− 4 27	−30 45			
			C.	−24 31	N.E. by N.		− 6 31	−31 02			
			C.	−25 00	N. by E. ½ E.	−82 20	− 3 21	−28 21	+1 30	−28 50	
	−68 24	183 20	Cr.	−26 47	N.N.E.		− 4 27	−31 14			
3.	−67 30	185 00	C.	−22 20	N.E. ¾ E.		− 9 04	−31 26			
			C.	−19 15	N.E. ¼ N.		− 7 30	−26 45			
			C.	−24 24	N.E. ½ N.		− 7 04	−31 28			
			C.	−23 27	E.N.E.	−82 00	−10 37	−34 04	+1 30	−29 46	
			C.	−24 07	N.E.		− 7 56	−32 03			
			Cr.	−25 40	N.N.E. ½ E.		− 5 12	−30 52			
			Cr.	−22 50	N.E. by E.		− 9 26	−32 16			
5.	−67 19	187 25	C.	−25 52	N. ½ W.		+ 0 57	−24 55			
			Cr.	−26 54	N. by W.	−81 10	+ 1 54	−25 00			
6.	−65 10	191 46	C.	−24 59	N. by E.		− 1 35	−26 34			
			C.	−24 14	N. by E. ½ E.	−79 30	− 2 21	−26 35	+1 30	−25 02	
			Cr.	−25 43	N.N.E.		− 3 08	−28 51			
	−64 56	192 24	Cr.	−27 15	N.		0 0	−27 15			
8.	−62 26	195 40	C.	−20 31	N. ¾ E.		− 0 58	−21 29			
			C.	−22 33	N.	−77 30	0 0	−22 33	+1 30	−19 41	
			Cr.	−18 16	N. by E.		− 1 18	−19 34			
			Cr.	−22 28	N. by W.		+ 1 18	−21 10			
9.	−61 00	199 00	C.	−17 27	N.E.		− 4 20	−21 47			
			C.	−14 35	E.N.E.		− 5 55	−20 30			
			Cr.	−17 46	N.E.	−76 10	− 4 20	−22 06	+1 30	−19 49	
			Cr.	−15 00	E.N.E.		− 5 55	−20 55			
10.	−60 20	205 36	C.	−15 04	E. by N. ½ N.		− 5 45	−20 49			
			C.	−14 25	E.N.E.		− 5 30	−19 55			
			C.	−13 58	E.N.E.	−75 15	− 5 30	−19 28	+1 30	−18 20	
		204 00	Cr.	−13 39	E.N.E.		− 5 30	−19 09			
12.	−60 18	212 00	C.	−12 51	E. by N.		− 5 34	−18 25			
			C.	−12 57	E. by N.		− 5 34	−18 31			
			C.	−12 59	E. by N.		− 5 34	−18 33			
			C.	−11 39	E.N.E.	−74 15	− 5 06	−16 45	+1 30	−17 19	
13.	−60 06	215 52	Cr.	−16 30	N.E.		− 3 43	−20 13			
14.	−59 12	219 18	Cr.	−16 01	N.E. by E.		− 4 29	−20 30			
15.	−58 50	222 00	C.	−12 10	E. by N.		− 5 26	−17 36			
			C.	−13 06	E.N.E.		− 4 59	−18 05			
			C.	−10 27	E. by N.	−73 55	− 5 26	−15 53	+1 30	−16 03	
			C.	−13 12	E. by N.		− 5 26	−18 38			
16.	−58 58	227 00	Cr.	−13 00	E. by S.	−73 05	− 5 31	−18 31	+1 30	−17 01	
18.	−60 18	236 30	C.	−18 40	E.		− 5 24	−24 04			
			C.	−15 26	E.	−73 00	− 5 24	−20 50	+1 30	−20 57	
			Cr.	−17 03	E.		− 5 24	−22 27			
19.	−60 02	240 31	Cr.	−17 53	E.N.E.	−72 15	− 4 25	−22 18	+1 30	−20 48	
22.	−58 28	251 40	C.	−18 33	E. by N.		− 4 29	−23 02			
			Cr.	−20 01	E.	−70 51	− 4 45	−24 46	+1 30	−22 46	
			Cr.	−19 58	E. by N.		− 4 29	−24 27			
			Cr.	−20 22	E. by N.		− 4 29	−24 51			
23.	−58 36	255 20	Cr.	−20 41	E. by N.		− 4 18	−24 59			
			C.	−24 18	S.S.E.		− 2 07	−26 25			
			C.	−23 57	S.E. ½ E.		− 4 00	−27 57			
			C.	−24 13	E. by N.	−70 11	− 4 18	−28 31	+1 30	−24 46	
			C.	−21 04	N.E. by E. ½ E.		− 3 41	−24 45			
			C.	−22 07	E. by N. ½ N.		− 4 09	−26 16			
			C.	−20 43	E. by N.		− 4 18	−25 01			

Observations of Declination (Continued.)

1842.	Position. Lat.	Position. Long.	Initials.	Declination observed.	Direction of ship's head.	Inclination.	Correction for ship's attraction.	Corrected Declination.	Correction for index error.	True Declination.	Remarks.
	° ′	° ′		° ′		° ′	° ′	° ′	° ′	° ′	
Mar. 24.	−58 46	257 50	C.	−21 52	E. ¾ N.		− 4 15	−26 07			
			C.	−24 59	E. by N.	−69 45	− 4 11	−29 10	+1 30	−26 13	
			Cr.	−23 41	E. by N.		− 4 11	−27 52			
25.	−58 54	262 48	Cr.	−27 53	E.N.E.	−68 50	− 3 38	−31 31			
26.	−59 02	268 40	C.	−23 47	E.N.E.		− 3 24	−27 11			
			C.	−24 43	E. by N. ¾ N.		− 3 29	−28 12			
			C.	−23 30	E. by N. ½ N.		− 3 34	−27 04			
			C.	−25 31	N.E. by E. ½ E.	−67 40	− 3 17	−28 48	+1 30	−26 25	
			Cr.	−22 22	E.N.E.		− 3 24	−25 46			
			Cr.	−25 51	N.E.		− 2 24	−28 15			
			Cr.	−22 29	E.		− 4 01	−26 30			
27.	−59 04	272 20	C.	−25 45	E.N.E.		− 3 16	−29 01			
			C.	−26 39	E.N.E.	−67 00	− 3 16	−29 55	+1 30	−27 08	
			Cr.	−25 53	E.N.E.		− 3 16	−29 09			
			Cr.	−23 12	E.N.E.		− 3 16	−26 28			
28.	−58 56	275 50	C.	−26 15	N.E. by E.		− 2 35	−28 50			
			C.	−27 37	N.E. by E.		− 2 35	−30 12			
	−58 54	276 40	C.	−30 22	N. by E.		− 0 33	−30 55			
			C.	−29 25	N. by E.	−65 30	− 0 33	−29 58	+1 30	−28 25	
			C.	−27 06	N.E. by E.		− 2 35	−29 41			
			C.	−27 54	N.E. by E.		− 2 35	−30 29			
			Cr.	−26 44	N.E. by E.		− 2 35	−29 19			
29.	−58 22	279 30	C.	−24 53	N.E. by E.		− 2 30	−27 23			
			C.	−25 19	N.E. by E.		− 2 30	−27 49			
	−58 20	280 00	C.	−31 06	N. by W.		+ 0 31	−30 35			
			C.	−29 30	N. by E.		− 0 31	−30 01			
			C.	−24 59	E.		− 3 30	−28 29			
			C.	27 46	N.E. ½ E.	−64 50	− 2 15	−30 01	+1 30	−27 13	
			C.	−25 09	E.N.E.		− 2 55	−28 04			
			C.	−25 27	E.N.E.		− 2 55	−28 22			
	−58 22	279 30	Cr.	−27 45	N.		0 0	−27 45			
			Cr.	−25 08	E.		− 3 30	−28 38			
30.	−58 30	282 00	C.	−24 51	N.E. by E. ½ E.		− 2 35	−27 26			
			C.	−24 19	E.N.E.		− 2 47	−27 06			
			C.	−25 46	N.E. ½ E.		− 2 08	−27 54			
			C.	−25 46	N.E. by E.		− 2 23	−28 09			
			C.	−25 16	N.E. by E.		− 2 23	−27 39			
			C.	−25 49	N.E. by E.	−63 40	− 2 23	−28 12	+1 30	−26 49	
			C.	−27 18	N.E. by E.		− 2 23	−29 41			
			C.	−25 46	N.E. by E.		− 2 23	−28 09			
			C.	−26 05	N.E. by E. ½ E.		− 2 35	−28 40			
			C.	−27 48	N.E. by E.		− 2 23	−30 11			
	−58 30	282 30	C.	−25 46	E. by N.		− 3 02	−28 48			
			C.	−25 43	E. by N.		− 3 02	−28 45			
			Cr.	−25 04	E.N.E.		− 2 41	−27 45			
			Cr.	−25 25	E. by N.		− 3 02	−28 27			
			Cr.	−23 46	E.N.E.	−63 00	− 2 41	−26 27	−1 30	−26 13	
31.	−58 26	285 08	C.	−26 49	N.E. by N.		− 1 23	−28 12			
			C.	−25 59	N.E. by N.		− 1 23	−27 22			
	−58 30	285 35	Cr.	−24 06	N.E.		− 1 50	−25 26			
April 1.	−57 35	288 54	Cr.	−25 30	N.E. by N.	−61 13	− 1 16	−26 46	+1 30	−25 16	
3.	−56 46	294 30	C.	−21 46	N.E.		− 1 30	−23 16			
			Cr.	−19 07	N.E.	−59 00	− 1 30	−20 37	+1 30	−20 26	
5.	−52 22	301 00	C.	−21 21	N. by E.		− 0 17	−21 38			
			C.	−18 20	N. by E.	−53 54	− 0 17	−18 38			
			C.	−20 32	N. by E.		− 0 17	−20 49	+1 30	−18 25	
6.	−51 50	301 35	C.	−19 07	N.N.W.	−52 30	+ 0 30	−18 37			

Observations of the Inclination made on board Her Majesty's Ship Erebus, with Needle R. F. 5, between April 1841 and August 1842.

Observers Captain Sir James Clark Ross and Lieutenant Alexander Smith, R.N.

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.	Remarks.
April 19.	Hobarton, Magnetic Observatory.		Direct.	−70 18·4					R. F. 4, used as deflector.
	−42 52	147 24	S.	−70 38·2					
			N.	−70 30·9					
			N.S.	−70 22·1					
20.			Direct.*	−70 26·3					
			N.S. at 24° 44′.	−70 30·6					
			S. at 56° 20′.	−70 02·7	Observed on shore.	....	−6	−70 32 −70 32	
			N. at 53° 02′.	−70 12·5					
24.			Direct.	−70 24·3					R. F. 3, used as deflector.
			S.	−70 34·4					
			N.	−70 41·6					
			S. at 38° 11′.	−70 32·7					
			N. at 43° 54′.	−70 29·9					
June 29.	At anchor.		Direct.	−71 38·9	N.	+81	−7	−70 31	R. F. 4, used as deflector.
			S.	−71 50·7	N.	+81	−7		
			Direct.	−71 40·5	N.N.E.	+78	−7	−70 35	
			S.	−71 52·5	N.N.E.	+78	−7		
			Direct.	−71 38·0	N.E.	+67	−7	−70 52	
			S.	−71 57·3	N.E.	+67	−7		
			Direct.	−71 13·4	E.N.E.	+47	−6	−70 42	
			S.	−71 31·8	E.N.E.	+47	−7		
			Direct.	−70 55·5	E.	+20	−6	−70 45	
			S.	−71 02·4	E.	+20	−6		
			Direct.	−70 21·5	E.S.E.	−12	−6	−70 42	
			S.	−70 25·8	E.S.E.	−12	−6		
			Direct.	−69 53·6	S.E.	−43	−6	−70 43	
			S.	−69 55·1	S.E.	−43	−6		
			Direct.	−69 17·0	S.S.E.	−67	−5	−70 44	
			S.	−69 46·4	S.S.E.	−67	−6		
			Direct.	−69 03·3	S.	−80	−5	−70 34	−70 39
			S.	−69 14·9	S.	−80	−5		
			Direct.	−69 26·5	S.S.W.	−67	−6	−70 46	
			S.	−69 40·3	S.S.W.	−67	−6		
			Direct.	−69 41·0	S.W.	−43	−6	−70 35	
			S.	−69 51·4	S.W.	−43	−6		
			Direct.	−70 14·8	W.S.W.	−12	−6	−70 39	
			S.	−70 26·6	W.S.W.	−12	−6		
			Direct.	−70 42·2	W.	+20	−6	−70 32	
			S.	−70 49·1	W.	+20	−6		
			Direct.	−71 10·4	W.N.W.	+47	−6	−70 34	
			S.	−71 19·3	W.N.W.	+47	−7		
			Direct.	−71 32·2	N.W.	+67	−7	−70 35	
			S.	−71 37·8	N.W.	+67	−7		
			Direct.	−71 42·4	N.N.W.	+78	−7	−70 39	
			S.	−71 58·3	N.N.W.	+78	−7		
			Direct.	−71 42·5	N.	+81	−7	−70 39	
			S.†	−72 03·3	N.	+81	−7		

* Observed on shore; face west. { Direct. −71° 40′·6; S. −71 09·6; N. −71 20·1; N.S. −71 10·8 }

† Face west. { Direct. −73° 07′·8; S. −72 34·9 } Head north.

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.	Remarks.
	° ′	° ′		° ′		′	′	° ′ ° ′	
July 7.			Direct.	−70 16·1	S.E. ½ E.	−37	−6		
			S.	−70 03·4	S.E. ½ E.	−37	−6		
			N.	−70 05·4	S.E. ½ E.	−37	−6	−70 54 −70 54	Running out of Storm Bay.
			N.S.	−70 12·0	S.E. ½ E.	−37	−6		
			Direct.	−70 18·9	S.E. ½ E.	−37	−6		
8.	−43 00	148 28	Direct.	−71 27·3	N.N.E.	+78	−7		
			S.	−71 43·2	N.N.E.	+78	−7		
			N.	−71 36·7	N.N.E.	+78	−7	−70 25 −70 25	A heavy head sea.
			N.S.	−71 39·1	N.N.E.	+78	−7		
			Direct.	−71 32·2	N.N.E.	+78	−7		
9.	−42 13	149 25	Direct.	−70 46·5	N.N.W.	+77	−6		
			S.	−70 56·3	N.N.W.	+77	−6		
			N.	−71 12 6	N.N.W.	+77	−7	−69 37 −69 37	A head sea.
			N.S.	−70 30·2	N.N.W.	+77	−6		
			Direct.	−70 36·5	N.N.W.	+77	−6		
10.	−40 55	149 12	Direct.	−69 52·4	N. by W.	+76	−6		
			S.	−69 53·7	N. by W.	+76	−6		
			N.	−69 47·1	N. by W.	+76	−6	−68 41 −68 41	
			N.S.	−69 49·2	N. by W.	+76	−6		
11.	−37 50	150 22	Direct.	−67 47·8	N. by W.	+72	−5		
			N.	−67 53·9	N. by W.	+72	−5		
			N.S.	−67 28·9	N. by W.	+72	−5	−66 36 −66 36	
			Direct.	−67 40·4	N. by W.	+72	−5		
12.	−37 21	151 33	Direct.	−67 01·6	N.E.	+62	−4		
			S.	−66 58·0	N.E.	+62	−4		
			N.	−67 03·3	N.E.	+62	−4	−66 01 −66 01	
			N.S.	−66 49·4	N.E.	+62	−4		
			Direct.	−67 04·8	N.E.	+62	−4		
13.	−36 01	151 48	Direct.	−66 19·0	N.W. by N.	+64	−4		
			N.	−65 57·0	N.W. by N.	+64	−4		
			N.S.	−65 52·9	N.W. by N.	+64	−4	−65 04 −65 04	Much motion.
			Direct.	−66 08·5	N.W. by N.	+64	−4		
14.	−33 52	151 21	Direct.	−64 05·9	N.	+67	−3		
			S.	−64 20·3	N.	+67	−3		
			N.	−64 05·4	N.	+67	−3	−63 15	Running along the land into Port Jackson.
			N.S.	−64 00·8	N.	+67	−3		
			Direct.	−65 03·8	N.	+67	−3		
14.	−33 51	151 20	Direct.	−63 49·0	N. by W.	+66	−3	−62 46	
			Direct.	−63 37·9	N.W.	+58	−3	−62 43	
			Direct.	−62 05·5	S.W. by W.	−17	−2	−62 25	
			Direct.	−62 03·1	S.E.	−35	−2	−62 40	
			Direct.	−61 52·5	S.S.W. ½ W.	−51	−2	−62 46	
31.			Direct.	−63 11·9	W.	+25	−2	−62 47	
	At anchor.		S.	−63 24·0	W.	+25	−3	−62 56	
	−33 51	151 17	Direct.	−62 19·1	W.S.W.	− 2	−2	−62 23	
			Direct.	−61 12·6	S.	−63	−2	−62 24	
			S.	−61 26·1	S.	−63	−2		
			Direct.	−61 31·5	S.S.W.	−53	−2	−62 34	
			S.	−61 47·5	S.S.W.	−53	−2		
Aug. 3.			Direct.	−63 30·1	N.E.	+58	−3	−62 40	
			S.	−63 40·9	N.E.	+58	−3		

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
July 15.	Garden Island, Sydney.		Direct.	−62 40·8*			−2			
			S.	−62 50·1			−2			
	−33 51	151 17	N.	−62 49·9			−2			
			N.S.	−62 42·9	Observed on shore.		−2			
Aug. 4.			Direct.	−62 45·9†			−2	−62 48	−62 48	
			S.	−62 50·1			−2			
			N.	−62 50·2			−2			
			N.S.	−62 40·3			−2			
5.			Direct.	−63 40·6	N.N.E.	+64	−3	−62 40		
			Direct.	−63 03·4	E. by N.	+35	−2			
			Direct.	−63 06·5	E. by N.	+35	−2			
			S.	−63 22·6	E. by N.	+35	−3	−62 43	−62 42	Running out of harbour.
			N.	−63 26·1	E. by N.	+35	−3			
			N.S.	−63 23·0	E. by N.	+35	−3			
			Direct.	−63 09·8	E. by N.	+35	−2			
6.	−33 52	154 07	Direct.	−63 09·3	E. by N.	+35	−2			
			S.	−63 38·9	E. by N.	+35	−3			
			N.	−63 11·4	E. by N.	+35	−2	−62 47	−62 47	Much motion.
			N.S.	−63 30·2	E. by N.	+35	−3			
			Direct.	−63 03·3	E. by N.	+35	−2			
7.	−33 51	157 18	Direct.	−62 47·0	E. by N.	+35	−2			
			S.	−62 43·3	E. by N.	+35	−2			
			N.	−62 35·7	E. by N.	+35	−2	−62 07	−62 07	Much motion.
			N.S.	−62 31·5	E. by N.	+35	−2			
			Direct.	−62 42·7	E. by N.	+35	−2			
8.	−33 27	160 43	Direct.	−62 04·4	E. by N.	+35	−2			
			S.	−61 59·5	E. by N.	+35	−2			
			N.	−61 55·1	E. by N.	+35	−2	−61 30	−61 30	
			N.S.	−62 13·7	E. by N.	+35	−2			
			Direct.	−62 02·0	E. by N.	+35	−2			
9.	−33 38	163 42	Direct.	−61 02·5	E.	+26	−1			
			S.	−61 31·5	E.	+26	−2			
			N.	−61 14·6	E.	+26	−2	−60 48	−60 48	
			N.S.	−61 18·4	E.	+26	−2			
			Direct.	−61 04·0	E. by N.	+35	−1			
10.	−33 38	166 28	Direct.	−61 11·7	N.E.	+56	−1			
			S.	−61 06·7	N.E.	+56	−1	−60 06	−60 07	
			N.	−60 45·7	N.E.	+56	−1			
			N.S.	−61 03·9	N.E.	+56	−1			
			Direct.	−60 33·2	E.	+26	−1	−60 08		
11.	−33 22	167 40	Direct.	−60 12·3	E. by N.	+35	−1			
			S.	−60 22·3	E. by N.	+35	−1			
			N.	−60 06·9	E. by N.	+35	−1	−59 39	−59 39	
			N.S.	−60 15·0	E. by N.	+35	−1			
			Direct.	−60 11·0	E. by N.	+35	−1			
12.	−32 58	169 20	Direct.	−59 44·4	E.N.E.	+43	−1			
			S.	−59 43·5	E.N.E.	+43	−1			
			N.	−59 38·7	E.N.E.	+43	−1	−59 04	−59 04	
			N.S.	−59 54·7	E.N.E.	+43	−1			
			Direct.	−59 49·1	E.N.E.	+43	−1			

* Observed on shore; face west.

Direct.	−63 53·3
S.	−63 44·8
N.	−63 33·1
N.S.	−63 38·5

† Observed on shore; face west. Direct. −63 51·7

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Aug. 13.	−32 12	170 27	Direct.	−58 47·3	S.E. by E.	−12	0			
			S.	−58 30·2	S.E. by E.	−12	0	−58 33	−58 33	Much motion.
			N.	−58 09·7	S.E. by E.	−12	0			
			N.S.	−57 55·2	S.E. by E.	−12	0			
14.	−33 27	171 21	Direct.	−57 30·0	S.E. by E.	−12	+1			
15.	−33 55	171 54	Direct.	−58 49·5	E. ½ S.	+20	0			
			S.	−59 03·7	E. ½ S.	+20	0			
			N.	−59 02·9	E. ½ S.	+20	0	−58 24	−58 24	A head swell.
			N.S.	−58 59·8	E. ½ S.	+20	0			
			Direct.	−58 42·5	E. ½ S.	+20	0			
16.	−34 00	172 01	Direct.	−57 46·5	S.E. by E. ½ E.	− 4	+1			
16.	−34 21	178 48	Direct.	−58 49·3	E.S.E.	+ 4	0			
17.	−34 29	173 36	Direct.	−58 26·0	E.S.E.	+ 4	0			
			S.	−58 42·5	E.S.E.	+ 4	0			
			N.	−58 02·7	E.S.E.	+ 4	0	−58 26	−58 26	Much motion.
			N.S.	−58 42·0	E.S.E.	+ 4	0			
			Direct.	−58 17·0	E.S.E.	+ 4	0			
			Direct.	−58 50·8	E.S.E.	+ 4	0			
23.	Bay of Islands.		Direct.	−59 26·4						
	−35 16	174 00	S.	−59 34·5						
			N.	−59 29·1						
			N.S.	−59 22·6						
			Direct.	−59 28·2*	Observed on shore.	.....	−1	−59 29	−59 29	
Oct. 27.			Direct.	−59 28 0†						
			S.	−59 43 2						
			N.	−59 31·9						
			N.S.	−59 26·2						
			Direct.	−59 28·3‡						
20.	At anchor.		Direct.	−60 17·1	N.W. ½ N.	+54	−1			
			S.	−61 03·1	N.W. ½ N.	+54	−1	−59 49		
			Direct.	−58 31·7	S.	−57	0			
			S.	−59 05·6	S.	−57	0			
Nov. 23.	−35 15	174 39	Direct.	−59 25·0	E.S.E.	+1	−1	−59 25	−59 28	Nov. 23, running along the land.
			Direct.	−59 37·7	E. by S.	+15	−1			
			Direct.	−59 30·7	E. by S.	+15	−1			
			S.	−59 23·8	E. by S.	+15	−1	−59 11		
			N.	−59 11·7	E. by S.	+15	−1			
			N.S.	−59 22·3	E. by S.	+15	−1			
24.	−36 27	177 34	Direct.	−59 50·0	E.S.E.	0	−1			
			Direct.	−59 56 2	E.S.E.	0	−1			
			S.	−59 48·2	E.S.E.	0	−1	−59 54	−59 54	
			N.	−59 48·2	E.S.E.	0	−1			
			N.S.	−60 03·2	E.S.E.	0	−1			
25.	−38 17	179 51	Direct.	−59 55·3	S.E. by S.	−34	−1			
			S.	−59 34·4	S.E. by S.	−34	−1			
			N.	−60 02·2	S.E. by S.	−34	−1	−60 32	−60 34	
			N.S.	−60 14·7	S.E. by S.	−34	−1			
			Direct.	−59 57·2	S.E. by S.	−34	−1			
			Direct.	−60 19·5	S.E.	−23	−1	−60 43		

* Observed on shore; face west.

Direct.	−60	33·0
S.	−60	30·1
N.	−60	28·4
N.S.	−60	19·6
Direct.	−60	31·9

† Observed on shore; face west.

Direct.	−60	30·1
S.	−60	33·1
N.	−60	40·4
N.S.	−60	14·9
Direct.	−60	32·0

‡ Observed on shore; face west. Nov. 13.

Direct.	−60	29·0
S.	−60	28 8
N.	−60	19·1
N.S.	−60	18·9
Direct.	−60	28·8

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Nov. 25.	−38 54	181 12	Direct.	−61 13·0	E.S.E.	0	−2	−61 15		
26.	−39 01	182 12	Direct.	−61 27·8	E. by S.	+14	−2			
			S.	−61 04·7	E. by S.	+14	−1			
			N.	−61 43·4	E. by S.	+14	−2	−61 15		A heavy sea and very much motion.
			N.S.	−61 29·7	E. by S.	+14	−2		−61 34	
			Direct.	−61 30·4	E. by S.	+14	−2			
27.	−39 18	182 58	Direct.	−61 02·9	S.	−50	−1			
			S.	−61 01·5	S.	−50	−1			
			N.	−61 16·4	S.	−50	−2	−61 57		
			N.S.	−61 11·1	S.	−50	−1			
			Direct.	−60 59·6	S.	−50	−1			
28.	−40 47	183 03	Direct.	−62 03·3	S.E. by E.	−10	−2			
			S.	−62 35·5	S.E. by E.	−10	−2			
			N.	−61 59·9	S.E. by E.	−10	−2	−62 21		
			N.S.	−61 59·8	S.E. by E.	−10	−2		−62 21	
			Direct.	−61 29·8	S. by E.	−49	−2	−62 21		
29.	−41 49	183 41	Direct.	−62 29·9	S. by E.	−49	−2			
			S.	−62 34·4	S. by E.	−49	−2			
			N.	−62 43·2	S. by E.	−49	−2	−63 28	−63 28	
			N.S.	−62 47·0	S. by E.	−49	−2			
			Direct.	−62 32·0	S. by E.	−49	−2			
30.	−43 32	183 03	Direct.	−63 38·3	S. ½ W.	−52	−3			
			S.	−64 16·6	S. ½ W.	−52	−3			
			N.	−63 48·1	S. ½ W.	−52	−3	−64 44	−64 44	
			N.S.	−63 43·9	S. ½ W.	−52	−3			
			Direct.	−63 38·9	S. ½ W.	−52	−3			
Dec. 1.	−45 40	183 20	Direct.	−66 08·5	S.E. by E.	−15	−4			
			S.	−66 34·2	S.E. by E.	−15	−4			
			N.	−66 03·2	S.E. by E.	−15	−4	−66 35	−66 35	A head sea.
			N.S.	−66 29·2	S.E. by E.	−15	−4			
			Direct.	−66 05·3	S.E. by E.	−15	−4			
2.	−47 19	184 40	Direct.	−67 41·2	S.E. by E. ½ E.	−11	−5			
			S.	−67 34·0	S.E. by E. ½ E.	−11	−5			
			N.	−67 34·0	S.E. by E. ½ E.	−11	−5	−67 56	−67 56	A head swell.
			N.S.	−67 32·5	S.E. by E. ½ E	−11	−5			
			Direct.	−67 56·0	S.E. by E. ½ E.	−11	−5			
3.	−48 43	186 30	Direct.	−68 51·5	E.S.E.	− 5	−5	−69 01		
			Direct.	−68 46·1	S.E. by E.	−20	−5			
			S.	−68 38·6	S.E. by E.	−20	−5	−69 08	−69 05	
			N.	−68 43·6	S.E. by E.	−20	−5			
			N.S.	−68 41·6	E.S.E.	− 5	−5	−68 52		
			Direct.	−68 49·7	S.E. by E.	−20	−5	−69 15		
4.	−49 20	187 41	Direct.	−69 32·4	E. by S.	+ 6	−6			
			S.	−70 10·2	E. by S.	+ 6	−6			
			N.	−69 48·6	E. by S.	+ 6	−6			
			N.S.	−69 50·0	E. by S.	+ 6	−6			
			Direct.	−69 24·4	E. by S.	+ 6	−6	−69 41	−69 41	
5.	−49 27	189 13	Direct.	−69 36·0	E. by S.	+ 6	−6			
			S.	−69 47·2	E. by S.	+ 6	−6			
			N.	−69 32·9	E. by S.	+ 6	−6			
			N.S.	−69 28·2	E. by S.	+ 6	−6			
6.	−50 00	191 00	Direct.	−69 17·5	E. by S.	+ 6	−6			
			S.	−69 51·7	E. by S.	+ 6	−6			
			N.	−69 37·0	E. by S.	+ 6	−6	−69 34		
			N.S.	−69 38·2	E. by S.	+ 6	−6		−69 43	
	−50 48	192 20	Direct.	−69 28·5	E. by S.	+ 6	−6			

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.	Remarks.
Dec. 7.	−50° 48′	192° 20′	Direct.	−69° 18′·8	S.E. by E.	−21′	−6′	−69° 43′	
			S.	−70 01·5	S.E. by E.	−21	−6		
			N.	−69 17·2	S.E. by E.	−21	−6	−69 58	
			N.S.	−69 04·5	S.E. ½ E.	−26	−5		
			Direct.	−69 17·0	S.E. ½ E.	−26	−6	−69 42	
8.	−51 34	194 29	Direct.	−70 04·1	E. by S.	+ 6	−6		
			S.	−70 33·6	E. by S.	+ 6	−6		
			N.	−70 12·3	E. by S.	+ 6	−6	−70 10	
			N.S.	−69 53·8	E. by S.	+ 6	−6		
			Direct.	−70 06·0	E. by S.	+ 6	−6		
9.	−52 02	197 53	Direct.	−70 19·0	E. by S.	+ 6	−6	−70 21	
			S.	−70 49·0	E. by S.	+ 6	−6		
			N.	−70 29·1	E. by S.	+ 6	−6		
			N.S.	−70 11·2	E. by S.	+ 6	−6	−70 32	
			Direct.	−70 17·0	E. by S.	+ 6	−6		
			Direct.	−70 18·0	E. by S.	+ 6	−6		
10.	−53 01	202 11	Direct.	−71 08·0	E. ½ N.	+25	−6		
			S.	−71 26·2	E. ½ N.	+25	−7		
			N.	−71 13·0	E. ½ N.	+25	−7	−70 53	
			N.S.	−71 09·7	E. ½ N.	+25	−6		
			Direct.	−71 05·0	E. ½ N.	+25	−6	−70 44	Ship unsteady; much motion.
11.	−52 48	203 50	Direct.	−70 35·9	E.	+19	−6		
			S.	−70 53·5	E.	+19	−6		
			N.	−70 54·6	E.	+19	−6	−70 35	
			N.S.	−71 11·2	E.	+19	−6		
			Direct.	−70 30·4	E.	+19	−6		
12.	−53 01	205 08	Direct.	−69 56·8	E.S.E.	− 6	−6		
			S.	−70 11·6	E.S.E.	− 6	−6		
			N.	−70 00·7	E.S.E.	− 6	−6		
			N.S.	−69 42·3	E.S.E.	− 6	−6	−70 10	−70 10
			Direct.	−69 56·5	E.S.E.	− 6	−6		
			Direct.	−70 01·5	E.S.E.	− 6	−6		
13.	−54 55	209 30	Direct.	−70 21·0	S.E. by E. ½ E.	−14	−6		
			S.	−70 55·7	S.E. by E. ½ E.	−14	−6		
			N.	−70 30·0	S.E. by E. ½ E.	−14	−6	−70 54	
			N.S.	−70 44·5	S.E. by E. ½ E.	−14	−6		
			Direct.	−70 23·5	S.E. by E. ½ E.	−14	−6		
	−55 08	210 04	Direct.	−70 26·5	S.E. by E. ½ E.	−14	−6	−70 58	
			S.	−71 04·2	S.E. by E. ½ E.	−14	−6		
			N.	−70 34·7	S.E. by E. ½ E.	−14	−6	−71 13	
			N.S.	−71 03·0	S.E. by E. ½ E.	−14	−6		
			Direct.	−70 27·5	S.E. by E. ½ E.	−14	−6		
	−55 20	210 28	Direct.	−70 35·5	S.E. by E. ½ E.	−15	−6		
			S.	−71 13·5	S.E. by E. ½ E.	−15	−7		
			N.	−70 48·7	S.E. by E. ½ E.	−15	−6	−71 11	
			N.S.	−70 53·0	S.E. by E. ½ E.	−15	−6		
			Direct.	−70 39·0	S.E. by E. ½ E.	−15	−6		
14.	−56 20	211 52	Direct.	−70 38·0	S.E. by S.	−47	−6	−71 28	
			S	−71 23·9	S.E. by S.	−47	−7		
			N.	−71 01·3	S.E. by S.	−47	−6	−71 46	
			N.S.	−70 36·2	S.E. by S.	−47	−6		
			Direct.	−70 43·0	S.E. by S.	−47	−6		

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.	Remarks.
Dec. 14.	−55° 55′	211° 38′	Direct.	−70° 51′·5	S.E. by s.	−48′	− 6′	° ′	
			S.	−71 59·2	S.E. by s.	−48	− 7		
			N.	−71 00·7	S.E. by s.	−48	− 6	−72 03	
			N.S.	−71 04·0	S.E. by s.	−48	− 6		
			Direct.	−70 50·3	S.E. by s.	−48	− 6		
15.	−56 55	212 34	Direct.	−71 09·5	S.S.E.	−58	− 6	−72 18	
			S.	−72 36·0	S.S.E.	−58	− 7		
			N.	−71 18·2	S.S.E.	−58	− 7	−72 33	
			N.S.	−71 14·5	S.S.E.	−58	− 7		
	−56 06	212 20	Direct.	−71 07·5	S.S.E.	−58	− 6		
			Direct.	−71 37·1	S.E. by s.	−48	− 7	−72 32	
			Direct.	−71 48·0	E.S.E.	− 9	− 7		
			S.	−72 14·8	E.S.E.	− 9	− 7	−72 08	
			N.	−71 30·0	E.S.E.	− 9	− 7		
			N.S.	−71 31·0	E.S.E.	− 9	− 7	−72 03	
			Direct.	−71 50·0	E.S.E.	− 9	− 7		
16.	−58 29	213 11	Direct.	−72 41·5	S.S.E.	−60	− 7		
			S.	−72 49·3	S.S.E.	−60	− 7		
			N.	−72 25·6	S.S.E.	−60	− 7		
			N.S.	−72 33·8	S.S.E.	−60	− 7	−73 40	
	−58 36	213 17	Direct.	−72 09·1	S.S.E.	−60	− 7		
	−58 52	213 22	Direct.	−72 41·7	S.S.E.	−61	− 7	−73 45	
			S.	−72 47·0	S.S.E.	−61	− 7		
			N.	−72 40·0	S.S.E.	−61	− 7	−73 52	
			N.S.	−72 44·6	S.S.E.	−61	− 7		
			Direct.	−72 47·7	S.S.E.	−61	− 7		
17.	−61 03	213 57	Direct.	−74 02·5	S.S.E.	−62	− 8		
			S.	−74 27·7	S.S.E.	−62	− 8		
			N.	−73 50·0	S.S.E.	−62	− 8		
			N.S.	−73 58·7	S.S.E.	−62	− 8	−75 15	
			Direct.	−74 04·6	S.S.E.	−62	− 8		
			Direct.	−74 08·0	S.S.E.	−62	− 8		
	−61 37	213 57	Direct.	−74 32·0	S. by E.	−69	− 8	−75 32	
			S.	−74 53·0	S. by E.	−69	− 8		
			N.	−74 07·0	S. by E.	−69	− 8	−75 47	
			N.S.	−74 25·0	S. by E.	−69	− 8		
			Direct.	−74 33·0	S. by E.	−69	− 8		
18.	−62 40	212 53	Direct.	−75 01·5	S.	−72	− 8		
			S.	−75 20·3	S.	−72	− 9		
			N.	−75 10·5	S.	−72	− 8	−76 38	
			N.S.	−75 47·0	S.	−72	− 9		
			Direct.	−75 07·8	S.	−72	− 8	−76 36	
			Direct.	−75 10·0	S. by W.	−70	− 8		
			Direct.	−75 18 0	S. by W.	−70	− 9	−76 32	
19.	−63 23	210 02	Direct.	−76 17·0	S.S.W.	−63	− 9		
			S.	−76 23·3	S.S.W.	−63	− 9		
			N.	−75 54·0	S.S.W.	−63	− 9	−77 26	−77 26
			N.S.	−76 24·0	S.S.W.	−63	− 9		
			Direct.	−76 12·6	S.S.W.	−63	− 9		
	−63 23	210 02	Direct.	−77 03·3			− 9		
			S.	−77 45·7	Observed		−10		
			N.	−77 08·3	on Ice.	.....	− 9	−77 25	−77 25
			N.S.	−77 04·6*			− 9		

* Observed on ice; face west. } Direct. −78° 20′·3.

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Dec. 19.	−63 23	210 02	Direct.	−76 48·8	s.w. by w.	−28	− 9	−77 26		
			Direct.	−77 02·5	w.s.w.	−13	− 9	−77 25	−77 30	
			Direct.	−76 31·2	s.w. by s.	−55	− 9	−77 35		
20.	−63 47	208 26	Direct.	−76 26·6	s. by w.	−71	− 9			
			S.	−77 23·7	s. by w.	−71	−10			
			N.	−76 03·0	s. by w.	−71	− 9	−77 58		
			N.S.	−76 36·6	s. by w.	−71	− 9		−77 57	
			Direct.	−76 33·7	s.s.w.	−63	− 9	−77 46		
21.	−64 38	206 53	Direct.	−76 42·5	s.	−74	− 9			
			S.	−77 34·8	s.	−74	−10	−78 32		
			N.	−76 39·4	s. by w.	−72	− 9			
			N.S.	−76 49·5	s. by w.	−72	− 9	−78 09		
			Direct.	−76 54·0	s. by w.	−72	− 9		−78 20	
	−64 50	206 37	Direct.	−77 02·0	s. by e.	−72	− 9	−78 23		
			Direct.	−76 58·0	s.	−74	− 9	−78 21		
			Direct.	−77 13·3	s.s.w.	−64	−10	−78 27		
	−64 53	206 30	Direct.	−77 15·8	s. by w.	−72	−10			
			S.	−78 13·2	s. by w.	−72	−10			
			N.	−77 18·0	s. by w.	−72	−10	−78 55		
			N.S.	−77 22·6	s. by w.	−72	−10			
			Direct.	−77 13·1	s.	−74	−10	−78 37	−78 57	
22.	−65 30	205 41	Direct.	−77 37·4	s.	−75	−10			
			Direct.	−77 37·4	s.	−75	−10			
			S.	−78 00·3	s.	−75	−10			
			N.	−77 47·2	s.	−75	−10	−79 06		
			N.S.	−77 27·6	s.	−75	−10			
			Direct.	−77 38·0	s.	−75	−10			
23.	−65 59	204 16	Direct.	−79 50·3	e.n.e.	+40	−11			
			S.	−80 53·5	e.n.e.	+40	−11	−79 53		
			Direct.	−78 04·0	s. by w.	−73	−10			
			S.	−79 32·3	s. by w.	−73	−11			
			N.	−78 11·2	s. by w.	−73	−10	−79 59		
			Direct.	−77 53·0	s.	−75	−10			
			S.	−78 44·7	s.	−75	−10			
			N.	−78 06·5	s.	−75	−10	−79 34		Fast to a piece of ice.
			N.S.	−77 51·8	s.	−75	−10			
24.	65 57	203 53	Direct.	−78 30·4	s.w. by w.	−30	−10	−79 10		
			Direct.	−80 25·6	n. by w.	+74	−11	−79 23		On the 24th lying becalmed alongside pieces of ice.
			Direct.	−80 11·7	n.e. by n.	+67	−11	−79 16	−79 31	
			Direct.	−79 49·2	n.w. ½ w.	+57	−11	−79 03		
			Direct.	−80 27·2	n.	+76	−11	−79 22		
			Direct.	−80 01·6	n.w.	+60	−11	−79 13		
			Direct.	−79 16·6	w. by n.	+28	−11	−79 00		
			Direct.	−79 33·4	w.n.w.	+40	−11	−79 04		
	−65 58	203 51	Direct.	−78 14·3	s.s.w.	−65	−10	−79 29		
			S.	−79 34·4	s.w. by s.	−57	−11			
			N.	−78 17·8	s.w. by s.	−57	−10	−79 47		
			N.S.	−78 05·6	s.w. by s.	−57	−10			
			Direct.	−78 20·1	s.w.	−45	−10	−79 15		
25.	−66 00	203 46	Direct.	−79 38·5	e.	+14	−11			
			S.	−80 52·7	e.	+14	−11			
			N.	−79 46·8	e.	+14	−11	−80 08		
			Direct.	−79 39·7	e.	+14	−11			
			Direct.	−80 29·6	n.w.	+60	−11	−79 54		
			Direct.	−79 45·6	e. by n.	+28	−11	−79 41	−79 53	

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
				° ′		′	′	° ′	° ′	
Dec. 26.	−66 11	203 36	Direct.	−78 57·0	S.E. by E.	−30	−10			
			S.	−79 45·1	S.E. by E.	−30	−11	−80 07		
			N.	−79 16·2	S.E. by E.	−30	−11		−79 53	
			Direct.	−79 02·1	S.E. by E.	−30	−10			
			Direct.	−79 59·2	N.W.	+60	−11			
			S.	−81 36·5	N.W.	+60	−12	−80 11		
27.	−66 16	203 31	Direct.	−79 51·5	E.	+14	−11	−79 48		
			Direct.	−79 48·5	E. ½ N.	+21	−11	−79 39		
28.	−66 20	203 22	Direct.	−81 15·2	N.	+76	−12	−80 05		
			Direct.	−81 05·8	N.	+76	−11			
29.	−66 24	203 51	Direct.	−80 43·5	N.E.	+60	−11	−80 14		
			S.	−81 22·4	N.E.	+60	−12			
			Direct.	−79 55·6	E.	+14	−11	−79 53	−79 57	
30.	−66 31	203 07	Direct.	−80 39·2	N.N.E.	+72	−11	−79 38		
			Direct.	−80 57·8	N.	+76	−11	−79 53		
			Direct.	−79 05·4	S.W.	−45	−10	−80 00		
			Direct.	−80 39·1	N.W. by W.	+55	−11	−79 55		
31.	−66 32	203 33	Direct.	−78 51·6	S.W. by S.	−57	−10	−79 59		
			Direct.	−78 30·1	S. by W. ½ W.	−69	−10	−79 49		
1842.										
Jan. 1.	−66 32	203 32	Direct.	−78 23·9	S.S.E.	−65	−10			
			S.	−78 47·5	S.S.E.	−65	−10			
			N.	−78 39·1	S.S.E.	−65	−10	−79 48		
			N.S.	−78 29·0	S.S.E.	−65	−10			
			Direct.	−78 24·8	S.S.E.	−65	−10			
3.	−66 35	203 29	Direct.	−80 56·0	N. by W. ½ W.	+73	−11		−79 55	Fast to the same piece of ice as Terror, distant 25 fathoms from her.
			S.	−81 30·1	N. by W. ½ W.	+73	−12			
			N.	−81 08·1	N. by W. ½ W.	+73	−11	−80 07		
			N.S.	−81 03·3	N. by W. ½ W.	+73	−11			
			Direct.	−81 05·3	N. by W. ½ W.	+73	−11			
4.	−66 34	203 51	Direct.	−79 01·8	S.E. by E.	−30	−10	−79 42		
			Direct.	−78 25·4	S. by E.	−73	−10	−79 48		
6.	−66 06	204 24	Direct.	−78 07·2	S.	−75	−10			
			S.	−78 45·8	S.	−75	−10			
			N.	−78 16·1	S.	−75	−10	−79 39		
			N.S.	−77 58·2	S.	−75	−10			
			Direct.	−78 06·1	S.	−75	−10			
7.	−66 13	204 19	Direct.	−78 11·3	S.	−75	−10		−79 44	Sailing amongst loose ice.
			Direct.	−80 04·6	N.W.	+60	−10	−80 15		
		204 25	Direct.	−78 13·7	S. by W.	−73	−10	−79 37		
			S.	−78 48·3	S.	−75	−10			
			N.	−78 26·9	S.	−75	−10	−79 51		
			N.S.	−78 02·6	S.	−75	−10			
			Direct.	−80 11·0	N.W.	+60	−10	−79 21		
8.	−66 14	204 33	Direct.	−80 35·1	N.	+76	−11	−79 30		
			Direct.	−80 09·6	N.E.	+60	−11	−79 21		
			Direct.	−79 31·2	E.	+14	−11	−79 28		
			Direct	−78 47·1	S.E.	−45	−10	−79 42		
			Direct.	−78 13·7	S.	−75	−10	−79 39		
			Direct.	−78 09·7	S.S.E.	−65	−10	−79 25		
	−66 12	204 33	Direct.	−80 19·2	N.W.	+60	−11		−79 34	
			S.	−80 44·6	N.W.	+60	−11	−79 41		
			N.	−80 35·3	N.W.	+60	−11			
			N.S.	−80 20·0	N.W.	+60	−11			
			Direct.	−78 09·7	S.S.E.	−65	−10			
			S.	−78 21·6	S.S.E.	−65	−10	−79 34		
			Direct.	−79 35·7	W.	+14	−11			
			Direct.	−78 53·6	S.W. by W.	−30	−10	−79 34		

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
								° ′	° ′	
Jan. 9.	−66 04	204 19	Direct.	−78 48·7	S.W. ½ W.	−37	−10	−79 36		
			Direct.	−79 24·0	E. by S.	− 1	−11	−79 36		
			Direct.	−78 39·5	S.W.	−45	−10	−79 35		
10.	−65 59	204 12	Direct.	−78 50·8	S.W. by W.	−30	−10			
			S.	−79 41·0	S.W. by W.	−30	−11	−79 41		
			N.	−78 40·9	S.W. by W.	−30	−10			
			N.S.	−78 47·0	S.W. by W.	−30	−10		−79 38	
			Direct.	−79 32·0	E.	+14	−11	−79 36		
			S.	−79 45·4	E.	+14	−11			
11.	−65 58	203 44	Direct.	−80 18·8	N.E. by E.	+55	−11	−79 35		
			Direct.	−78 19·8	S.	−75	−10	−79 45		
12.	−65 54	203 32	Direct.	−78 25·0	S.W.	−45	−10	−79 38		
			S.	−79 00·8	S.W.	−45	−10			
			Direct.	−78 26·9	S.W. ½ S.	−51	−10	−79 28		
13.	−66 11	203 03	Direct.	−79 08·0	S.W. ¾ W.	−34	−10	−79 52		
			Direct.	−79 06·4	S.W. by W.	−30	−10	−79 46		
	−66 12	203 05	Direct.	−78 02·0	S.S.E.	−65	−10			
			S.	−78 26·2	S.S.E.	−65	−10	−79 24	−79 35	
			N.	−78 00·7	S.S.E.	−65	−10			
			N.S.	−78 07·4	S.S.E.	−65	−10			
			Direct.	−80 37·5	N.N.E.	+72	−10			
			S.	−80 51·9	N.N.E.	+72	−10	−79 43		
			N.	−80 36·8	N.N.E.	+72	−11			
			N.S.	−80 40·1	N.N.E.	+72	−11	−79 37		
			Direct.	−80 35·5	N.N.E.	+72	−11			
14.	−66 14	203 09	Direct.	−80 34·2	N.E. by E.	+55	−11	−79 50		
			Direct.	−78 00·9	S. by W.	−73	−10	−79 24	−79 33	
			Direct.	−80 28·4	N.E.	+60	−11	−79 39		
			Direct.	−78 08·3	S. by W.	−73	−10	−79 31		
15.	−66 02	202 30	Direct.	−78 28·0	S.W.	−45	−10	−79 23		
16.	−65 49	202 02	Direct.	−79 21·4	E.	+14	−11	−79 18		
			S.	−79 28·9			−11			
			N.	−79 33·2	Observed		−11			
			N.S.	−79 58·8	on ice.	....	−11	−79 47	−79 47	
			Direct.	−79 22·4*			−11			
19.	−66 18	201 22	Direct.	−79 08·3	S.W. by W.	−30	−10	−79 48		
			Direct.	−81 06·4	N. by E.	+74	−11	−80 03		
21.	−66 49	202 40	Direct.	−78 33·0	S. by E.	−73	−10			
			S.	−79 08·5	S. by E.	−73	−10		−80 01	
			N.	−78 35·4	S. by E.	−73	−10	−80 05		
			N.S.	−78 29·5	S. by E.	−73	−10			
28.	−67 38	204 01	Direct.	−81 23·9	N.	+76	−12			
			N.	−81 37·4	N.	+76	−12	−80 30		
			S.	−81 39·4	N.	+76	−12			
			Direct.	−78 53·5	S.	−75	−10	−80 19		
			Direct.	−79 00·5	S. by W. ½ W.	−69	−10	−80 20	−80 22	
29.	−67 32	203 59	Direct.	−79 00·4	S.S.W.	−65	−10			
			S.	−79 04·6	S.S.W.	−65	−10			
			N.	−79 01·8	S.S.W.	−65	−10	−80 17		
			N.S.	−79 01·9	S.S.W.	−65	−10			

* Observed on ice, face west } Direct. −80° 39′·2.

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Jan. 30.	−67 18	203 39	Direct.	−79 30·8	S.W. ½ S.	−51	−11			
			S.	−80 28·3	S.W. ½ S.	−51	−11	−80 47		
			N.	−79 38·7	S.W. ½ S.	−51	−11			
			N.S.	−79 25·5	S.W. ½ S.	−51	−11			
			Direct.	−79 59·3	S. by W.	−73	−10	−81 22		
31.	−67 21	202 15	Direct.	−79 04·4	S.W.	−45	−10		−80 26	
			S.	−79 19·5	S.W.	−45	−11	−80 02		
			N.	−79 04·2	S.W.	−45	−10			
			N.S.	−79 00·3	S.W.	−45	−10			
			Direct.	−79 39·1	W.S.W.	−15	−11			
Feb. 1.	−67 11	202 07	Direct.	−79 48·5	W.S.W.	−15	−11	−80 09		
2.	−67 57	200 00	Direct.	−79 22·4	S.E.	−45	−11	−80 18		
			Direct.	−79 59·5	S. by W.	−73	−11	−81 24		
			Direct.	−79 32·0	S.S.E. ½ E.	−61	−11		−80 46	
			S.	−79 49·7	S.S.E. ½ E.	−61	−11			
			N.	−79 30·2	S.S.E. ½ E.	−61	−11	−80 44		
			N.S.	−79 23·0	S.S.E. ½ E.	−61	−11			
			Direct.	−79 27·3	S.S.E. ½ E.	−61	−11			
3.	−68 21	200 03	Direct.	−80 01·0	S.E. by S.	−57	−11			
			S.	−79 53·0	S.E. by S.	−57	−11			
			N.	−79 50·4	S.E. by S.	−57	−11	−81 04		Much motion.
			N.S.	−79 57·1	S.E. by S.	−57	−11			
			Direct.	−79 56·8	S.E. by S.	−57	−11			
4.	−68 42	199 44	Direct.	−79 58·7	S. ½ E.	−74	−11			
			S.	−80 17·9	S. ½ E.	−74	−11		−81 14	
			N.	−79 57·9	S. ½ E.	−74	−11	−81 24		
			N.S.	−79 41·9	S. ½ E.	−74	−11			
			Direct.	−79 59·2	S. ½ E.	−74	−11			
	−68 49	199 41	Direct.	−82 12·8	N. by W.	+74	−12	−81 09		
5.	−68 59	196 07	Direct.	−80 53·5	S.W.	−45	−11	−81 00		
		195 51	Direct.	−80 49·0	S.W. by S.	−57	−11			
			S.	−81 02·2	S.W. by S.	−57	−11	−81 57	−81 54	
			N.	−80 46·0	S.W. by S.	−57	−11			
			N.S.	−80 39·6	S.W. by S.	−57	−11			
			Direct.	−81 52·8	W. ½ N.	+22	−12	−81 43		
6.	−69 48	192 25	Direct.	−81 08·5	S. by W.	−74	−11			
			S.	−81 28·9	S. by W.	−74	−12			
			N.	−81 11·0	S. by W.	−74	−11	−82 35	−82 35	
			N.S.	−80 47·4	S. by W.	−74	−11			
			Direct.	−81 12·3	S. by W.	−74	−12			
7.	−70 05	191 10	Direct.	−81 45·1	S.W.	−46	−12	−82 43		
			S.	−81 50·1	S.S.W.	−66	−12		−82 51	Much motion.
			N.	−81 38·8	S.S.W.	−66	−12			
			N.S.	−81 13·2	S.S.W.	−66	−12	−82 53		
			Direct.	−81 29·8	S.S.W.	−66	−12			
	−70 17	190 15	Direct.	−81 43·0	S.S.W.	−66	−12			
	−70 26	189 00	Direct.	−82 07·0	S.S.W.	−66	−12			
			S.	−81 39·2	S.S.W.	−66	−12			
			N.	−81 44·5	S.S.W.	−66	−12	−83 07	−83 07	Much motion.
			N.S.	−81 27·0	S.S.W.	−66	−12			
			Direct.	−82 10·2	S.S.W.	−66	−12			
8.	−70 18	186 01	Direct.	−81 50·6	S.	−77	−12			
			S.	−81 59·7	S.	−77	−12			
			N.	−81 49·3	S.	−77	−12	−83 18	−83 18	
			N.S.	−81 37·1	S.	−77	−12			
			Direct.	−81 50·0	S.	−77	−12			

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
								° ′		
Feb. 9.	−70 39	185 31	Direct.	−82 06·3	S. by E.	−75	−12	−83 33		
			Direct.	−82 24·5	S.E. by S.	−58	−12		−83 35	
			S.	−82 50·4	S.E. by S.	−58	−12			
			N.	−82 14·6	S.E. by S.	−58	−12	−83 36		
			N.S.	−82 17·0	S.E. by S.	−58	−12			
			Direct.	−82 23·2	S.E. by S.	−58	−12			
10.	−70 11	183 50	Direct.	−83 23·9	W. by S.	0	−13			
			S.	−83 21·9	W. by S.	0	−13			
			N.	−83 17·2	W. by S.	0	−13	−83 33	−83 33	A head swell.
			N.S.	−83 17·1	W. by S.	0	−13			
			Direct.	−83 21·9	W. by S.	0	−13			
	−70 04	183 36	Direct.	−83 25·0*	S. by W.	−75	−13	−84 53		A head swell.
11.	−70 06	181 50	Direct.	−82 47·0	S.W. by S.	−58	−12	−83 57		
	−70 10	181 34	Direct.	−82 58·5	S.W.	−47	−12			
			N.	−83 07·2	S.W.	−47	−12	−83 49		
			N.S.	−82 25·0	S.W.	−47	−12		−84 06	A heavy cross sea.
12.	−71 00	180 44	Direct.	−83 01·3	S.E. by S.	−58	−12			
			S.	−83 03·7	S.E. by S.	−58	−12			
			N.	−83 18·7	S.E. by S.	−58	−13	−84 18		
			N.S.	−83 12·7	S.E. by S.	−58	−13			
			Direct.	−83 05·5	S.E. by S.	−58	−12			
13.	−72 46	181 46	Direct.	−83 32·6	S.E. by S.	−59	−13			
			S.	−84 23·9	S.E. by S.	−59	−13			
			N.	−83 46·0	S.E. by S.	−59	−13	−85 01		
			N.S.	−83 45·2	S.E. by S.	−59	−13		−85 04	
			Direct.	−83 36·7	S.E. by S.	−59	−13			
			Direct.	−84 04·8	S.E.	−47	−13	−85 05		
14.	−73 23	183 04	Direct.	−84 36·5	S.E. ½ S.	−53	−13	−85 42	−86 02	Very much motion.
15.	−74 24	177 09	Direct.	−85 07·0	S.S.E. ½ E.	−63	−13	−86 23		
16.	−74 56	173 36	Direct.	−85 17·0	S.S.E.	−69	−14			
			S.	−85 51·8	S.S.E.	−69	−14			
			N.	−85 20·5	S.S.E.	−69	−14	−86 48		
			N.S.	−85 10·0	S.S.E.	−69	−13		−86 52	Very unsteady.
			Direct.	−85 21·0	S. by E. ½ E.	−74	−14	−86 49		
			Direct.	−86 03·6	S.E.	−48	−14	−87 06		
	−75 10	173 08	Direct.	−86 46·9	E.	+16	−14			
			S.	−87 28·5	E.	+16	−15			
			N.	−87 06·9	E.	+16	−14	−86 59	−86 59	
			N.S.	−86 56·4	E.	+16	−14			
			Direct.	−86 48·5	E.	+16	−14			
17.	−75 53	175 05	Direct.	−87 01·5	E.N.E.	+42	−14			
	−76 00	175 15	Direct.	−87 03·5	E.N.E.	+42	−14			
			S.	−87 29·1	E.N.E.	+42	−15			
			N.	−87 26·9	E.N.E.	+42	−15	−86 44	−86 44	
			N.S.	−87 06·3	E.N.E.	+42	−14			
			Direct.	−87 07·0	E.N.E.	+42	−14			
18.	−76 58	181 03	Direct.	−86 58·5	E.N.E.	+42	−14			
			S.	−87 17·7	E.N.E.	+42	−15			
			N.	−87 37·8	E.N.E.	+42	−15	−86 46	−86 46	
			N.S.	−87 18·8	E.N.E.	+42	−15			
			Direct.	−86 57·8	E.N.E.	+42	−14			

* This observation differs so widely from the others made on the same day, that, considering the unfavourable state of the weather, I have omitted it in the mean results: possibly the ship's head may have been W. by S. instead of S. by W., in which case the observation would agree well with the others.—E. S.

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
				° ′		′	′	° ′	° ′	
Feb. 19.	−76 42	184 09	Direct.	−87 24·5	N. by E.	+78	−15			
			S.	−86 57·7	N. by E.	+78	−14			
			N.	−87 15·6	N. by E.	+78	−15	−86 07	−86 07	Ship pitching.
			N.S.	−86 56·5	N. by E.	+78	−14			
			Direct.	−87 21·2	N. by E.	+78	−15			
	−76 46	186 15	Direct.	−87 08·0	N.N.E.	+75	−14	−86 07		
20.	−76 14	192 35	Direct.	−85 58·3	N.E. ½ E.	+60	−14	−85 12	−85 18	A head sea and much motion.
21.	−75 53	194 52	Direct.	−84 24 3	S.W.	−47	−13	−85 24		
22.	−76 42	194 48	Direct.	−84 03·9	S.E. by S.	−60	−13			
			S.	−84 19·6	S.E. by S.	−60	−13			
			N.	−84 24·0	S.E. by S.	−60	−13	−85 25	−85 25	A swell from the southward.
			N.S.	−84 10·5	S.E. by S.	−60	−13			
			Direct.	−84 04·0	S.E. by S.	−60	−13			
	−76 42	194 10	Direct.	−84 56·5	E.S.E.	−17	−13	−85 26		
	−77 05	194 38	Direct.	−84 53·0	E. by S.	0	−13			
			S.	−85 36 6	E. by S.	0	−14			
			N.	−85 16·0	E. by S.	0	−14	−85 24	−85 24	
			N.S.	−85 13·0	E. by S.	0	−14			
			Direct.	−84 55·0	E. by S.	0	−13			
23.	−77 49	197 24	Direct.	−84 26·5	E. by S.	0	−13	−84 40		
			Direct.	−84 05·3	S.W. by W.	−33	−13	−84 51		
	−78 07	197 44	Direct.	−84 40·3	E. ½ S.	+ 8	−13	−84 45	−84 49	
	−78 07	197 46	Direct.	−84 51·9	W. by N.	+30	−13	−84 35		
24.	−76 55	198 40	Direct.	−84 12 0	S.W.	−47	−13	−85 12		
25.	−74 50	193 45	Direct.	−84 41·0	W.	+15	−13			
			S.	−84 57·7	W.	+15	−13			
			N.	−85 13·0	W.	+15	−14	−84 53		
			N.S.	−84 50·0	W.	+15	−13		−84 49	
			Direct.	−84 50·3	W. by N.	+30	−13	−84 33		
			Direct.	−83 27·2	S.S.W.	−68	−13	−84 48		
26.	−72 46	189 59	Direct.	−85 15·7	N.W. by W.	+57	−14			
			S.	−85 38·0	N.W. by W.	+57	−14			
			N.	−85 14·5	N.W. by W.	+57	−14	−84 38	−84 38	
			N.S.	−85 25·5	N.W. by W.	+57	−14			
			Direct.	−85 11·3	N.W. by W.	+57	−13			
27.	−72 01	187 35	Direct.	−83 38·0	W.S.W.	−16	−13			
			S.	−83 48·2	W.S.W.	−16	−13			
			N.	−83 44·1	W.S.W.	−16	−13	−84 10	−84 10	
			N.S.	−83 44·2	W.S.W.	−16	−13			
			Direct.	−83 40·8	W.S.W.	−16	−13			
28.	−71 08	184 59	Direct.	−84 05·5	W.	+15	−13			
			S.	−84 18·4	W.	+15	−13			
			N.	−84 06·5	W.	+15	−13	−84 04	−84 04	
			N.S.	−84 10·4	W.	+15	−13			
			Direct.	−84 04·5	W.	+15	−13			
			Direct.	−83 48·6	W.	+15	−13			
Mar. 1.	−69 52	180 04	Direct.	−84 35·5	W. by N.	+33	−13			
			S.	−83 59·2	W. by N.	+33	−13			
			N.	−83 45·0	W. by N.	+33	−13	−83 34	−83 34	
			N.S.	−83 39·7	W. by N.	+33	−13			
			Direct.	−83 32·0	W. by N.	+33	−13			
	−69 44	179 53	Direct.	−84 59·1	N. by E.	+93	−13			
			S.	−84 36·6	N. by E.	+93	−13			
			N.	−84 54·2	N. by E.	+93	−13	−83 31	−83 31	A northerly swell.
			N.S.	−84 52·0	N. by E.	+93	−13			
			Direct.	−84 54·0	N. by E.	+93	−13			

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
Mar. 2.	−68° 04′	183° 25′	Direct.	−83° 43·3	N.N.E.	+90′	−13′			
			S.	−83 54·0	N.N.E.	+90	−13			
			N.	−83 50·2	N.N.E.	+90	−13	−82 28		
			N.S.	−83 38·2	N.N.E.	+90	−13			
			Direct.	−83 37·5	N.N.E.	+90	−13			
			Direct.	−83 03·2	N.E. by N.	+82	−12		−82 13	
			S.	−83 14·4	N.E. by N.	+82	−13			
			N.	−83 12·7	N.E. by N.	+82	−13	−81 57		
			N.S.	−83 04·7	N.E. by N.	+82	−12			
			Direct.	−82 59·0	N.E. by N.	+82	−12			
3.	−67 32	185 09	Direct.	−82 31·0	E.N.E.	+51	−12			
			S.	−82 41·5	E.N.E.	+51	−12			
			N.	−82 44·3	E.N.E.	+51	−12	−81 56		
			N.S.	−82 23·6	E.N.E.	+51	−12		−81 51	
			Direct.	−82 48·7	N.E. by N.	+81	−12	−81 40		
	−67 28	185 33	Direct.	−82 34·8	N.E.	+74	−12	−81 33		
4.	−67 29	188 11	Direct.	−80 39·5	W.S.W.	−20	−11	−81 11		A very heavy sea and much motion.
5.	−67 16	188 10	Direct.	−82 05·6	N. by E.	+91	−12			
			N.	−82 37·2	N. by E.	+91	−12	−80 59	−81 02	A very heavy swell from the westward.
			N.S.	−82 29·0	N. by E.	+91	−12			
			Direct.	−81 59·0	N. by E.	+91	−12			
6.	−65 25	191 48	Direct.	−80 28·3	N. by E.	+89	−11			
			N.	−80 41·9	N. by E.	+89	−11			
			N.S.	−80 54·6	N. by E.	+89	−11	−79 19	−79 19	Much motion.
			Direct.	−80 31·8	N. by E.	+89	−11			
	−65 06	192 21	Direct.	−80 24·0	N. by E.	+89	−11			
7.	−63 30	194 22	Direct.	−79 37·0	N. by E.	+88	−11			
			Direct.	−79 31·3	N. by E.	+88	−11			
			S.	−79 44·5	N. by E.	+88	−11			
			N.	−79 08·1	N. by E.	+88	−10	−78 11	−78 11	
			N.S.	−79 20·2	N. by E.	+88	−11			
			Direct.	−79 27·4	N. by E.	+88	−11			
8.	−62 16	196 10	Direct.	−78 35·1	N. by E.	+87	−10			
			S.	−78 40·4	N. by E.	+87	−10			
			N.	−78 30·5	N. by E.	+87	−10	−77 17	−77 17	
			N.S.	−78 34·0	N. by E.	+87	−10			
			Direct.	−78 31·9	N. by E.	+87	−10			
9.	−61 14	198 38	Direct.	−77 33·0	N.E. by N.	+76	−10			
			S.	−78 15·5	N.E. by N.	+76	−10			
			N.	−77 36·7	N.E. by N.	+76	−10	−76 34	−76 34	
			N.S.	−77 24·7	N.E. by N.	+76	−10			
	−60 58	199 11	Direct.	−77 23·8	N.E. by N.	+76	−10			
	−60 50	200 11	Direct.	−76 36·5	N.E. by N.	+75	−9			
			S.	−77 19·5	N.E. by N.	+75	−10			
			N.	−76 31·7	N.E. by N.	+75	−9	−75 33	−75 33	
			N.S.	−76 09·5	N.E. by N.	+75	−9			
			Direct.	−76 34·0	N.E. by N.	+75	−9			
10.	−60 18	203 55	Direct.	−75 33·0	E.N.E.	+48	−9	−74 54		
	−60 18	204 11	Direct.	−75 23·0	E. by N.	+33	−9			
			S.	−76 07·5	E. by N.	+33	−9		−75 08	A cross sea, ship pitching.
			N.	−76 18·0	E. by N.	+33	−9			
			N.S.	−75 48·2	E. by N.	+33	−9	−75 11		
			Direct.	−75 24·4	E. by N.	+33	−9			
11.	−60 18	208 29	Direct.	−74 27·0	E. by N.	+33	−9			Very much motion.

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
Mar. 12.	−60 13	211 34	Direct.	−74 06·5	E. by N.	+33	−8			
			S.	−74 23·3	E. by N.	+33	−8			
			N.	−74 57·0	E. by N.	+33	−8			
			N.S.	−74 57·5	E. by N.	+33	−8	−74 21	−74 21	A heavy swell, ship very unsteady.
			Direct.	−74 18·0	E. by N.	+33	−8			
	−60 12	212 32	Direct.	−74 02·5	E. by N.	+33	−8			
13.	−60 00	216 12	Direct.	−73 56·0	N.E.	+67	−8	−72 57		
14.	−59 24	218 58	Direct.	−73 26·6	N.E. by E.	+59	−8			
			S.	−74 20·7	N.E. by E.	+59	−8			
			N.	−73 57·5	N.E. by E.	+59	−8			
			N.S.	−73 47·2	N.E. by E.	+59	−8	−73 13		
			Direct.	−73 35·3	N.E. by E.	+59	−8		−73 30	Very unsteady.
			Direct.	−73 17·5	N.E. by E.	+59	−9			
	−59 16	219 30	Direct.	−73 10·5	N.E. by E.	+59	−8			
			S.	−74 54·1	N.E. by E.	+59	−8			
			N.	−74 42·7	N.E. by E.	+59	−8	−74 03		
			N.S.	−74 49·5	N.E. by E.	+59	−8			
15.	−58 54	222 04	Direct.	−74 32·1	E.N.E.	+48	−8			
			S.	−74 07·2	E.N.E.	+48	−8			
			N.	−74 26·1	E.N.E.	+48	−8	−73 41		
			N.S.	−74 11·7	E.N.E.	+48	−8			
			Direct.	−74 28·8	E.N.E.	+48	−8		−73 38	
	−58 50	223 24	Direct.	−73 57·5	E. by N.	+33	−8			
			Direct.	−73 55·0	E. by N.	+33	−8	−73 31		
16	−59 00	227 32	Direct.	−73 11·8	E.	+19	−7			
			Direct.	−73 11·0	E.	+19	−7			
	−59 04	228 57	S.	−72 20·2	E.	+19	−7			
			N.	−73 06·0	E.	+19	−7	−72 57	−72 57	
			N.S.	−73 54·2	E.	+19	−8			
			Direct.	−73 14·5	E.	+19	−8			
			Direct.	−73 07·3	E.	+19	−7			
17.	−59 39	232 48	Direct.	−72 45·0	E. ½ S.	+12	−7			
			S.	−72 57·6	E. ½ S.	+12	−7			
			N.	−73 23·0	E. ½ S.	+12	−7	−72 54	−72 54	A great deal of motion.
			N.S.	−73 10·7	E. ½ S.	+12	−7			
			Direct.	−72 39·0	E. ½ S.	+12	−7			
	−59 45	233 53	Direct.	−72 24·5	E. ½ S.	+12	−7			
			S.	−73 00·5	E. ½ S.	+12	−7			
			N.	−73 16·7	E. ½ S.	+12	−7	−72 51	−72 51	A great deal of motion.
			N.S.	−73 03·0	E. ½ S.	+12	−7			
18.	−60 16	236 11	Direct.	−72 35·5	E. by S.	+ 4	−7			
			S.	−73 02·2	E. by S.	+ 4	−7			
			N.	−73 21·7	E. by S.	+ 4	−8	−73 00	−70 00	Ship unsteady.
			N.S.	−72 57·0	E. by S.	+ 4	−7			
			S.	−73 04·2	E.	+19	−7			
	−60 21	237 02	Direct.	−72 29·8	E.	+19	−7			
			S.	−73 16·5	E.	+19	−8			
			N.	−73 25·6	E.	+19	−8	−72 45	−72 45	Ship rolling deeply.
			N.S.	−73 01·3	E.	+19	−7			
			Direct.	−72 33·0	E.	+19	−7			
	−60 20	237 50	Direct.	−72 57·5	E. by N.	+33	−7			
			S.	−73 24·1	E. by N.	+33	−8			
			N.	−73 44·0	E. by N.	+33	−8	−72 56	−72 44	
			N.S.	−73 19·0	E. by N.	+33	−8			

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Mar. 18.	−60 20	237 50	Direct.	−73 15·0	E. by N. ½ N.	+40	−8			
	−60 19	238 00	Direct.	−72 24·5	E. by N. ½ N.	+40	−7			
			S.	−72 55·7	E. by N. ½ N.	+40	−7	−72 34	−72 44	
			N.	−73 24·6	E. by N. ½ N.	+40	−8			
			N.S.	−73 30·6	E. by N. ½ N.	+40	−8			
19.	−60 02	241 03	Direct.	−72 52·5	E.N.E.	+47	−7			
	−60 01	241 38	Direct.	−72 45·5	E.N.E.	+47	−7			
			S.	−73 47·5	E.N.E.	+47	−8	−72 40	−72 40	Much motion.
			N.	−73 43·0	E.N.E.	+47	−8			
			N.S.	−73 28·0	E.N.E.	+47	−8			
20.	−59 17	245 40	Direct.	−72 08·0	E.N.E.	+47	−7			
			S.	−72 12·0	E.N.E.	+47	−7			
			N.	−72 01·0	E.N.E.	+47	−7	−71 29	−71 29	
			N.S.	−72 14·0	E.N.E.	+47	−7			
			Direct.	−72 09·5	E.N.E.	+47	−7			
21.	−59 15	248 12	Direct.	−71 33·5	E. by N.	+33	−7			
			S.	−72 10·0	E. by N.	+33	−7			
			N.	−71 55·9	E. by N.	+33	−7	−71 26	−71 26	
			N.S.	−72 11·2	E. by N.	+33	−7			
			Direct.	−71 35·2	E. by N.	+33	−7			
	−59 04	248 50	Direct.	−71 53·5	N.E. ½ E.	+61	−7	−70 59		
	−58 58	249 24	Direct.	−71 46·0	N.E. by E.	+58	−7			
			S.	−72 01·2	N.E. by E.	+58	−7			
			N.	−71 53·0	N.E. by E.	+58	−7	−71 08	−71 04	
			N.S.	−72 14·7	N.E. by E.	+58	−7			
			Direct.	−71 30·6	E.N.E.	+47	−7	−70 51		
22.	−58 28	252 01	Direct.	−71 11·0	E. by N.	+33	−6	−70 44		
	−58 29	252 22	Direct.	−71 02·4	E. ½ N.	+26	−6			
			S.	−71 33·5	E. ½ N.	+26	−7			
			N.	−71 05·8	E. ½ N.	+26	−6	−70 52	−70 50	A head sea.
			N.S.	−71 07·4	E. ½ N.	+26	−6			
23.	−58 35	255 10	Direct.	−70 26·0	E. ½ N.	+26	−6			
			S.	−70 36·9	E. ½ N.	+26	−6			
			N.	−70 45·2	E. ½ N.	+26	−6	−70 11	−70 11	
			N.S.	−70 16·0	E. ½ N.	+26	−6			
			Direct.	−70 30·0	E. ½ N.	+26	−6			
24.	−58 44	257 49	Direct.	−70 04·5	E. ½ N.	+26	−6			
			S.	−70 29·6	E. ½ N.	+26	−6			
			N.	−70 24·7	E. ½ N.	+26	−6	−69 47	−69 47	
			N.S.	−69 49·2	E. ½ N.	+26	−6			
	−58 51	258 34	Direct.	−69 48·3	E. ½ N.	+26	−6			
25.	−58 56	263 52	Direct.	−68 52·8	E. by N. ½ N.	+40	−5			A heavy swell.
26.	−59 01	267 59	Direct.	−67 56·0	E. by N. ½ N.	+40	−5			
			S.	−68 21·7	E. by N. ½ N.	+40	−5			
			N.	−68 18·7	E. by N. ½ N.	+40	−5	−67 39	−67 39	
			N.S.	−67 56·8	E. by N. ½ N.	+40	−5			
			Direct.	−67 59·5	E. by N. ½ N.	+40	−5			
27.	−59 02	271 58	Direct.	−67 25·5	E.N.E.	+46	−5			
			S.	−68 44·6	E.N.E.	+46	−5			
			N.	−67 35·7	E.N.E.	+46	−5	−67 01	−67 01	Ship unsteady.
			N.S.	−67 13·7	E.N.E.	+46	−5			
			Direct.	−67 30·5	E.N.E.	+46	−5			

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Mar. 28.	−58 55	276 30	Direct.	−66 10·0	N.E. by E.	+55	−4			
	−58 50	277 12	Direct.	−66 13·0	N.E. by E.	+55	−4			
			S.	−66 41·4	N.E. by E.	+55	−4	−65 27	−65 27	
			N.	−66 22·2	N.E. by E.	+55	−4			
			N.S.	−66 14·5	N.E. by E.	+55	−4			
			Direct.	−66 09·5	N.E. by E.	+55	−4			
29.	−58 23	280 03	Direct.	−65 40·5	N.E. ½ E.	+57	−4			
			S.	−65 56·7	N.E. ½ E.	+57	−4			
			N.	−65 46·0	N.E. ½ E.	+57	−4	−64 49	−64 49	
			N.S.	−65 28·5	N.E. ½ E.	+57	−4			
			Direct.	−65 36·0	N.E. ½ E.	+57	−4			
30.	−58 29	282 04	Direct.	−64 27·9	N.E. by E. ½ E.	+50	−3			
			S.	−64 27·7	N.E. by E. ½ E.	+50	−3			
			N.	−64 39·2	N.E. by E. ½ E.	+50	−3	−63 44	−63 41	
			N.S.	−64 29·9	N.E. by E. ½ E.	+50	−3			
	−58 28	282 32	Direct.	−64 22·0	N.E. ½ E.	+54	−3	−63 31		
31.	−58 34	285 44	Direct.	−63 52·3	N.E. ½ N.	+58	−3	−62 57		
			Direct.	−63 49·0	N.E. by N.	+60	−3		−63 05	A very heavy swell.
	−58 29	286 04	N.	−64 34·2	N.E. by N.	+60	−3	−63 7		
			N.S.	−64 10·0	N.E. by N.	+60	−3			
			Direct.	−63 43·0	N.E. by N.	+60	−3			
April 1.	−57 22	289 50	Direct.	−62 24·0	N.E. by N.	+56	−2			
			S.	−62 16·2	N.E. by N.	+56	−2			
			N.	−61 50·6	N.E. by N.	+56	−2	−61 15	−61 15	
			N.S.	−61 59·0	N.E. by N.	+56	−2			
			Direct.	−62 17·0	N.E. by N.	+56	−2			
2.	−57 10	292 11	Direct.	−59 31·0	E.N.E.	+44	−1			
			S.	−59 28·3	E.N.E.	+44	−1			
			N.	−59 55·5	E.N.E.	+44	−1	−58 45	−58 51	A swell from the westward.
			N.S.	−58 59·0	E.N.E.	+44	0			
			Direct.	−59 25·3	E.N.E.	+44	−1			
	−57 17	292 32	Direct.	−58 35·5	S.S.E.	−46	0	−59 21		
3.	−56 40	294 46	Direct.	−59 44·0	N.E.	+55	−1			
			S.	−60 36·7	N.E.	+55	−1			
			N.	−60 05·7	N.E.	+55	−1	−59 01	−59 01	
			N.S.	−59 36·5	N.E.	+55	−1			
			Direct.	−59 33·5	N.E.	+55	−1			
4.	−54 50	298 08	Direct.	−57 34·0	N. by E.	+54	0			
			N.	−57 00·3	N. by E.	+54	0			
			N.S.	−57 10·0	N. by E.	+54	0	−56 10	−56 10	Too much motion to use S.
			Direct.	−57 24·0	N. by E.	+54	0			
5.	−52 54	300 27	Direct.	−54 47·5	N.N.E.	+47	+2			
			S.	−54 56·6	N.N.E.	+47	+2			
			N.	−54 45·7	N.N.E.	+47	+2	−53 52	−53 52	
			N.S.	−54 30·7	N.N.E.	+47	+2			
			Direct.	−54 26·0	N.N.E.	+47	+2			
6.	−52 36	301 18	Direct.	−54 23·8	N.N.E.	+41	+2	−53 41		
	−51 47	302 15	Direct.	−53 08·0	N.W. by N.	+42	+3	−52 23	−52 34	
			Direct.	−52 10·0	E. by S.	+18	+3	−51 39		
11.	Port Louis, Falkland Islands.		Direct.	−52 29·1						
			S.	−52 42·7						
	−51 32	301 53	N.	−52 37·9	Observed					
			N.S.	−52 41·2*	on shore.	..	+3	−52 30	−52 30	

* Observed on shore; face west.

Direct.	−53° 48′·9
S.	−53 29·2
N.	−53 45·9
N.S.	−53 41·5

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
Aug. 19.	−51° 32′	301° 53′	Direct.	−52° 20′·6	Observed on shore.	.. ′	+3′	−52° 30′	−52° 30′	
			S.	−52 35·6						
			N.	−52 24·4						
			N.S.	−52 31·5*						
17.	−51 32	301 53	Direct.	−52 46·5	W.	+37	+3	−52 14		
			S.	−53 00·9	W.	+37	+3			
			Direct.	−52 38·8	W.N.W.	+38	+3	−51 58		
			S.	−52 39·4	W.N.W.	+38	+3			
	At Anchor.		Direct.	−52 45·8	N.W.	+42	+3	−52 08		
			S.	−52 59·5	N.W.	+42	+3			
			Direct.	−52 53·0	N.N.W.	+41	+3	−52 06		
			S.	−52 46·4	N.N.W.	+41	+3			
			Direct.	−52 54·0	N.	+41	+3	−52 09		
			S.	−52 52·3	N.	+41	+3			
			Direct.	−52 37·5	N.N.E.	+41	+3	−51 57		
			S.	−52 44·0	N.N.E.	+41	+3			
			Direct.	−52 42·5	N.E.	+42	+3	−51 58		
			S.	−52 43·2	N.E.	+42	+3			
			Direct.	−52 42·2	E.N.E.	+38	+3	−52 02		
			S.	−52 44·7	E.N.E.	+38	+3			
			Direct.	−52 32·0	E.	+37	+3	−51 47	−52 05	
			S.	−52 21·5	E.	+37	+3			
			Direct.	−52 31·0	E.S.E.	+ 9	+3	−52 13		
			S.	−52 20·1	E.S.E.	+ 9	+3			
			Direct.	−52 13·2	S.E.	−14	+3	−52 29		
			S.	−52 22·6	S.E.	−14	+3			
			Direct.	−51 51·7	S.S.E.	−32	+3	−52 33		
			S.	−52 16·2	S.S.E.	−32	+3			
			Direct.	−51 21·0	S.	−40	+3	−52 13		
			S.	−51 51·0	S.	−40	+3			
			Direct.	−51 33·0	S.S.W.	−32	+3	−51 58		
			S.	−51 25·0	S.S.W.	−32	+3			
			Direct.	−51 51·0	S.W.	−14	+3	−51 35		
			S.	−51 40·7	S.W.	−14	+3			
			Direct.	−52 22·0	W.S.W.	+ 9	+3	−52 05		
			S.	−52 12·5	W.S.W.	+ 9	+3			
			Direct.	−52 46·8	W.	+37	+3	−52 07		

To obtain corrections for the ship's attraction.

* Observed on shore; face west.

Direct.	−53° 34′·2
S.	−53 31·8
N.	−53 24·3
N.S.	−53 21·8

Observations of the Inclination made in Her Majesty's Ship Terror, with Needle F. C. B., between April 1841 and August 1842.

Observers Captain Francis Rawdon Crozier, and Mr. Thomas Moore, Mate, R.N.

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
				° ′		′	′	° ′	° ′	
Apr. 19.	Hobarton Magnetic Observatory.		Direct.	−70 29·6	Observed on shore.	....	−35	−70 52	−70 52	A spare needle (marked C.) was used as deflector N. and deflector S.; and the magnets of the apparatus as Mag. N. Mag. S. and Mag. N.S.
			Direct.	−70 25·9		....	−35			
	−42 52	147 24*	Def. N.	−69 33·5		....	−81			
			Def. S.	−70 17·9		....	−35			
			Mag. N.S.	−70 09·6		....	−35			
			Mag. N.	−70 09·9		....	−35			
			Mag. S.	−70 10·7†		....	−35			
July 7.	Running out of Storm Bay.		Direct.	−69 46·5	S.E. ¾ E.	−32	−35	−71 00	−71 00	Ship steady.
			Def. N.	−69 29·9	S.E. ¾ E.	−32	−81			
			Def. S.	−69 38·8	S.E. ¾ E.	−32	−35			
			Direct.	−69 51·2	S.E. ¾ E.	−32	−35			
8.	−43 03	148 20	Direct.	−70 58·0	W. ¼ N.	+27	−35	−71 18	−70 44	Ship very steady.
			Def. N.	−70 50·4	W. ¼ N.	+27	−81			
			Def. S.	−71 02·0	W. ¼ N.	+27	−35			
			Direct.	−71 04·0	W. ¼ N.	+27	−35			
9.	−42 24	149 30	Direct.	−70 43·3	N.N.W.	+76	−35	−70 10		
			Def. N.	−70 34·1	N.N.W.	+76	−81			
			Def. S.	−70 36·0	N.N.W.	+76	−35			
			Direct.	−70 45·5	N.N.W.	+76	−35			
10.	−40 51	149 28	Direct.	−69 42·7	N. by W.	+78	−35	−69 05	−69 05	Ship very steady.
			Def. N.	−69 19·7	N. by W.	+78	−81			
			Def. S.	−69 37·7	N. by W.	+78	−35			
			Direct.	−69 47·0	N. by W.	+78	−35			
11.	−38 17	150 22	Direct.	−67 41·3	N. by E.	+73	−35	−66 57	−66 57	Ship very steady.
			Def. N.	−67 23·3	N. by E.	+73	−81			
			Def. S.	−67 07·0	N. by E.	+73	−35			
			Direct.	−67 42·7	N. by E.	+73	−35			

* Observations at Hobarton to obtain corrections for the ship's attraction.

June 22. At anchor	Direct...	−70 14·3	W.	Direct...	−69 54·9 E.
	Def. N...	−69 52·5	W.	Def. N...	−69 21·9 E.
	Direct...	−69 59·0	W.S.W.	Direct...	−70 14·1 E.N.E.
	Def. N...	−69 38·4	W.S.W.	Def. N...	−69 51·5 E.N.E.
	Direct...	−69 24·5	S.W.	Direct...	−70 21·4 N.E.
	Def. N...	−68 49·9	S.W.	Def. N...	−70 12·0 N.E.
	Direct...	−68 57·0	S.S.W.	Direct...	−70 31·6 N.N.E.
	Def. N...	−68 38·2	S.S.W.	Def. N...	−70 16·9 N.N.E.
	Direct...	−68 37·5	S.	Direct...	−70 48·2 N.
	Def. N...	−68 30·9	S.	Def. N...	−70 28·2 N.
	Direct...	−68 40·0	S.S.E.	Direct...	−71 01·8 N.N.W.
	Def. N...	−68 14·3	S.S.E.	Def. N...	−70 42·3 N.N.W.
	Direct...	−68 52·2	S.E.	Direct...	−70 59·6 N.W.
	Def. N...	−68 26·4	S.E.	Def. N...	−70 13·9 N.W.
	Direct...	−69 22·6	E.S.E.	Direct...	−70 47·6 W.N.W.
	Def. N...	−68 59·1	E.S.E.	Def. N...	−70 32·5 W.N.W.

† Observed on shore; face west.

Direct.....	−70 39·9	Mag. N.S...	−70 54·4	Mag. S..... −70 39·9
Direct.....	−70 40·2	Mag. N.....	−70 54·4	Def. N. .... −71 25·9
Def. S.....	−70 40·0			

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
				° ′		′	′	° ′	° ′	
July 12.	−37 28	151 30	Direct.	−66 45·1	N.E. ¼ N.	+63	−35			
			Def. N.	−66 40·0	N.E. ¼ N.	+63	−81	−66 22	−66 22	Ship steering steadily.
			Def. S.	−66 19·1	N.E. ¼ N.	+63	−35			
			Direct.	−66 49·7	N.E. ¼ N.	+63	−35			
13.	−36 21	151 39	Direct.	−66 24·5	N.N.W. ¼ W.	+69	−35			
			Def. N.	−66 35·9	N.N.W. ¼ W.	+69	−81	−66 11	−66 11	Ship unsteady.
			Direct.	−66 29·1	N.N.W. ¼ W.	+69	−35			
14.	−34 06	151 19	Direct.	−63 25·9	N.	+67	−35			
			Def. N.	−63 08·4	N.	+67	−81			
			Def. S.	−63 11·9	N.	+67	−35	−62 58	−62 58	Steering steadily.
			Direct.	−63 29·6	N.	+67	−35			
19.	Garden Island, Sydney.		Direct.	−62 29·3*		....	−35			
			Def. N.	−61 36·7		....	−81			
	−33 51	151 17	Def. S.	−62 29·8		....	−35			
			Mag. N.	−62 15·2	Observed on shore.	....	−35	−62 59	−62 59	
			Mag. S.	−62 17·4		....	−35			
			Mag. N.S.	−62 14·0		....	−35			
			Direct.	−62 28·8		....	−35			
30.	At anchor.		Direct.	−62 36·6	W. by S.	+12	−35	−63 00		
Aug. 4.			Direct.	−63 06·1	W.	+25	−35	−63 16		
			Direct.	−63 03·3	W. ½ S.	+18	−35	−63 20		
5.			Direct.	−62 06·4	S.W. by W.	−16	−35	−62 57		
			Direct.	−62 16·0	S.W. ½ W.	−25	−35	−63 16		
5.	Running out of harbour.		Direct.	−62 52·9	E. by N. ½ N.	+39	−35	−62 49	−62 52	Head swell on the 5th, steering badly.
			Def. N.	−62 14·1	E. by N. ½ N.	+39	−81	−62 56		
			Def. S.	−62 25·4	E. by N. ½ N.	+39	−35	−62 21		
			Mag. N.	−62 34·4	E. by N. ½ N.	+39	−35	−62 30		
			Mag. S.	−62 44·6	E. by N. ½ N.	+39	−35	−62 41		
			Direct.	−62 43·5	E. by N. ½ N.	+39	−35	−62 40		
6.	−34 01	153 17	Direct.	−62 31·3	E. by N.	+35	−35			
			Def. N.	−62 06·1	E. by N.	+35	−81			
			Def. S.	−62 28·2	E. by N.	+35	−35			
			Direct.	−62 27·2	E. by N.	+35	−35	−62 30	−62 30	Steering badly.
	−33 54	153 54	Direct.	−62 23·7	E. by N.	+35	−35			
			Def. N.	−62 02·6	E. by N.	+35	−81			
			Def. S.	−62 02·8	E. by N.	+35	−35			
			Direct.	−62 24·1	E. by N.	+35	−35			
7.	−33 56	156 38	Direct.	−61 40·6	E. by N.	+35	−35			
			Def. N.	−61 09·9	E. by N.	+35	−81			
			Def. S.	−61 40·7	E. by N.	+35	−35	−61 46	−61 46	Steering wildly.
			Direct.	−61 47·6	E. by N.	+35	−35			
8.	−33 31	160 20	Direct.	−61 17·4	E. by N.	+35	−35			
			Def. N.	−60 38·1	E. by N.	+35	−81			
			Def. S.	−60 22·1	E. by N.	+35	−35	−61 04	−61 04	Steering tolerably.
			Direct.	−61 14·2	E. by N.	+35	−35			
9.	−33 42	164 05	Direct.	−60 40·6	E.	+26	−35			
			Def. N.	−60 17·2	E.	+26	−81			
			Def. S.	−60 30·8	E.	+26	−35	−60 52	−60 52	Steering badly.
			Direct.	−60 37·7	E.	+26	−35			

* Observed on shore; face west.

Direct.	−62 52·9	Mag. N.....	−63 00·8	Mag. N. and S.	−63 03·7
Def. N.	−63 00·7	Mag. S.....	−62 57·0	Direct.	−62 52·3
Def. S.	−62 52·4				

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Aug. 10.	−33 47	166 39	Direct.	−59 59·9	E. by N. ½ N.	+39	−35			
			Def. N.	−59 56·7	E. by N. ½ N.	+39	−81			
			Def. S.	−59 38·1	E. by N. ½ N.	+39	−35	−60 02		
			Direct.	−60 02·2	E. by N. ½ N.	+39	−35			
	−33 42	166 36	Direct.	−59 42·3	E.	+26	−35			
			Def. N.	−59 00·3	E.	+26	−81		−59 55	Long swell, motion quick, steering steadily.
			Def. S.	−59 42·7	E.	+26	−35			
			Mag. N.	−59 21·1	E.	+26	−35	−59 49		
			Mag. S.	−59 39·9	E.	+26	−35			
			Direct.	−60 02·2	E. by N.	+36	−35			
11.	−33 34	167 37	Direct.	−60 13·9	N.E. by E.	+50	−35			
			Def. N.	−59 18·4	N.E. by E.	+50	−81			
			Def. S.	−60 03·5	N.E. by E.	+50	−35			
			Mag. N.	−60 04·1	N.E. by E.	+50	−35	−59 49		
			Mag. S.	−60 01·4	N.E. by E.	+50	−35		−59 58	Wind light, with a heavy swell, motion quick.
			Mag. N.S.	−59 54·0	N.E. by E.	+50	−35			
			Direct.	−60 09·5	N.E. by E.	+50	−35			
	−33 31	167 41	Direct.	−59 53·1	E.	+26	−35			
			Def. N.	−59 17·2	E.	+26	−81	−60 07		
12.	−33 00	169 20	Direct.	−58 59·8	E.N.E.	+43	−35			
			Def. N.	−58 22·6	E.N.E.	+43	−81			
			Def. S.	−58 56·9	E.N.E.	+43	−35			
			Mag. N.	−58 36·5	E.N.E.	+43	−35	−58 43		
			Mag. S.	−58 23·1	E.N.E.	+43	−35		−58 43	Motion quick, steering well.
			Direct.	−58 56·7	E.N.E.	+43	−35			
			Direct.	−59 10·4	N.E.	+52	−35			
			Mag. N.S.	−58 40·5	N.E.	+52	−35			Ship unsteady.
			Direct.	−59 09·1	N.E.	+52	−35	−58 43		
13.	−32 12	170 27	Direct.	−56 21·9	S.E. by E.	−10	−35			
			Def. N.	−56 00·5	S.E. by E.	−10	−81			
			Def. S.	−56 18·1	S.E. by E.	−10	−35	−57 13		
			Direct.	−56 24·6	S.E. by E.	−10	−35			
14.	−32 11	171 20	Direct.	−56 58·5	S.E. by E.	−10	−35			
			Def. N.	−56 11·3	S.E. by E.	−10	−81		−57 28	Much motion, steering well.
			Def. S.	−56 40·0	S.E. by E.	−10	−35			
			Mag. N.	−56 46·1	S.E. by E.	−10	−35	−57 36		
			Mag. N.S.	−56 55·9	S.E. by E.	−10	−35			
			Mag. S.	−56 49·8	S.E. by E.	−10	−35			
			Direct.	−56 51·0	S.E. by E.	−10	−35			
15.	−33 55	171 59	Direct.	−57 39·5	E. by S.	+14	−35			
			Def. N.	−57 06·2	E. by S.	+14	−81	−58 17		
			Direct.	−58 22·1	E. ½ N.	+32	−35		−58 24	A head sea, table very unsteady.
			Def. N.	−57 57·4	E. ½ N.	+32	−81	−58 32		
			Direct.	−58 20·8	E. ½ N.	+32	−35			
	−33 58	172 06	Direct.	−57 57·7	E.S.E.	+ 4	−35			
			Def. N.	−57 32·5	E.S.E.	+ 4	−81			
			Def. S.	−57 22·1	E.S.E.	+ 4	−35			
			Mag. N.	−57 24·9	E.S.E.	+ 4	−35	−58 14	−58 14	Head sea, steering badly, ship unsteady.
			Mag. N.S.	−57 30·0	E.S.E.	+ 4	−35			
			Mag. S.	−57 22·9	E.S.E.	+ 4	−35			
			Direct.	−58 00·5	E.S.E.	+ 4	−35			
16.	−34 15	172 50	Direct.	−59 25·6	N.W. ½ N.	+51	−35			
			Def. N.	−59 00·3	N.W. ½ N.	+51	−81			
			Def. S.	−58 46·2	N.W. ½ N.	+51	−35			
			Mag. N.	−59 01·4	N.W. ½ N.	+51	−35	−58 48		Head sea, steering badly, ship unsteady.
			Mag. N.S.	−58 55·8	N.W. ½ N.	+51	−35		−58 48	

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
Aug. 16.	−34° 15′	172° 50′	Mag. S.	−58° 08′·6	N.W. ½ N.	+51′	−35′	−58° 48′	−58° 48′	Head sea, steering badly, ship unsteady.
			Direct.	−59 24·6	N.W. ½ N.	+51	−35			
			Direct.	−58 26·9	E. by S. ½ S.	+ 7	−35			
			Mag. N.S.	−58 04·7	E. by S. ½ S.	+ 7	−35	−58 46		
			Direct.	−58 23·1	E. by S. ½ S.	+ 7	−35			
17.	−34 24	173 43	Direct.	−58 33·2	E. by S. ½ S.	+ 7	−35			
			Def. N.	−58 21·7	E. by S. ½ S.	+ 7	−81			
			Def. S.	−58 23·3	E. by S. ½ S.	+ 7	−35			
			Mag. N.	−58 25·9	E. by S. ½ S.	+ 7	−35	−59 00	−59 00	Strong wind, a good deal of motion.
			Mag. N.S.	−58 25·5	E. by S. ½ S.	+ 7	−35			
			Mag. S.	−58 21·4	E. by S. ½ S.	+ 7	−35			
			Direct.	−58 26·8	E. by S. ½ S.	+ 7	−35			
18.	Running into the Bay of Islands.		Direct.	−58 20·6	S.W.	−30	−35			
			Def. N.	−58 08·4	S.W.	−30	−81	−59 36	−59 36	Heavy sea, steering wildly.
			Direct.	−58 19·2	S.W.	−30	−35			
Oct. 21.	Bay of Islands, New Zealand.		Direct.	−59 00·4			−35	−59 34		
			Def. N.	−57 57·5			−81	−59 18		
	−35 16	174 00	Def. S.	−59 05·1			−35	−59 40		
			Mag. N.	−58 41·0			−35	−59 16		
			Mag. N.S.	−58 43·6			−35	−59 19		
			Mag. S.	−58 38·4			−35	−59 13		
			Direct.	−59 01·0	Observed on shore.		−35	−59 36	−59 25	Magnetic observatory.
29.			Direct.	−59 00·8			−35	−59 36		
			Def. N.	−57 58·4			−81	−59 19		
			Def. S.	−58 59·2			−35	−59 34		
			Mag. N.	−58 38·7			−35	−59 14		
			Mag. N.S.	−58 40·3			−35	−59 15		
			Mag. S.	−58 37·1			−35	−59 12		
			Direct.	−59 02·2*			−35	−59 37		
Nov. 23.	Running out of Bay of Islands, about one mile from Piercy Island.		Direct.	−57 50·2	S.E. by E.	−17	−35	−58 42		
			Direct.	−58 34·3	E. by S.	+11	−35	−58 58		Very steady.
			Def. N.	−57 57·1	E. by S.	+11	−81	−59 07		
			Def. S.	−58 40·9	E. by S.	+11	−35	−59 05		
			Direct.	−58 34·2	E. by S.	+11	−35	−58 58		
24.	−36 20	177 27	Direct.	−59 13·5	E.S.E.	− 5	−35	−59 53	−59 20	
			Def. N.	−58 23·2	E.S.E.	− 5	−81	−59 49		
			Def. S.	−58 53·7	E.S.E.	− 5	−35	−59 34		
			Mag. N.	−58 39·2	E.S.E.	− 5	−35	−59 19		Ship unsteady.
			Mag. N.S.	−58 37·0	E.S.E.	− 5	−35	−59 17		
			Mag. S.	−58 37·3	E.S.E.	− 5	−35	−59 17		
			Direct.	−59 14·7	E.S.E.	− 5	−35	−59 55		
25.	−38 00	179 34	Direct.	−59 41·1	S.E. by S.	−40	−35	−60 56		
			Def. N.	−58 31·6	S.E. by S.	−40	−81	−60 33		
			Def. S.	−58 54·4	S.E. by S.	−40	−35	−60 09		
			Mag. N.	−58 54·0	S.E. by S.	−40	−35	−60 09		
			Mag. N.S.	−59 02·5	S.E. by S.	−40	−35	−60 17		
			Mag. S.	−58 55·4	S.E. by S.	−40	−35	−60 10		
			Direct.	−59 37·6	S.E. by S.	−40	−35	−60 53		
	−38 27	179 59	Direct.	−60 11·8	S.E. by E. ½ E.	−12	−35	−60 59	−60 37	Head sea, table unsteady.

* Observed on shore; face west.

Direct...	Oct. 21.	−59° 47′·6	Oct. 29. −59° 54′·6
Def. N..	Oct. 21.	−60 13·9	Oct. 29. −60 10·7
Def. S. ..	Oct. 21.	−60 00·5	Oct. 29. −60 06·3
Mag. N...	Oct. 21.	−60 10·3	Oct. 29. −60 13·1
Mag. N.S.	Oct. 21.	−60 13·7	Oct. 29. −60 01·2
Mag. S..	Oct. 21.	−60 07·4	Oct. 29. −60 12·8
Direct....	Oct. 21.	−59 48·6	Oct. 29. −59 58·5

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
Nov. 25.	−38° 27′	179° 59′	Def. N.	−59° 06′·2	S.E. by E. ½ E.	−12′	−81′	−60° 39′	−60° 37′	Head sea, table unsteady.
			Def. S.	−60 03·3	S.E. by E. ½ E.	−12	−35	−60 50		
			Mag. N.	−59 51·3	S.E. by E. ½ E.	−12	−35	−60 38		
			Mag. N.S.	−59 46·0	S.E. by E. ½ E.	−12	−35	−60 33		
			Mag. S.	−60 00·6	S.E. by E. ½ E.	−12	−35	−60 48		
			Direct.	−60 12·9	S.E. by E. ½ E.	−12	−35	−61 00		
	−38 57	181 18	Direct.	−60 00·6	E.S.E.	− 5	−35	−60 41		Heavy sea, much motion, observations not satisfactory.
26.	−38 48	182 05	Direct.	−61 08·6	E.S.E.	− 5	− 35	−61 49		
			Def. N.	−60 00·6	E.S.E.	− 5	−81	−61 27		
			Def. S.	−60 37·7	E.S.E.	− 5	−35	−61 18		
			Direct.	−60 11·9	S.E.	−31	−35	−61 18		
			Def. N.	−59 07·5	S.E.	−31	−81	−61 00		Tolerably steady.
			Def. S.	−59 48·8	S.E.	−31	−35	−60 55		
			Mag. N.	−59 36·8	S.E.	−31	−35	−60 43		
			Mag. N.S.	−59 48·5	S.E.	−31	−35	−60 54		
			Mag. S.	−59 38·9	S.E.	−31	−35	−60 45	−61 21	
			Direct.	−60 08·7	S.E.	−31	−35	−61 15		
	−39 02	182 35	Direct.	−61 14·4	E.S.E.	− 5	−35	−61 54		
			Def. N.	−60 13·3	E.S.E.	− 5	−81	−61 39		
			Def. S.	−60 46·2	E.S.E.	− 5	−35	−61 26		
			Mag. N.	−60 42·2	E.S.E.	− 5	−35	−61 22		Head swell with considerable motion.
			Mag. N.S.	−60 51·5	E.S.E.	− 5	−35	−61 31		
			Mag. N.	−60 06·7	E.S.E.	− 5	−35	−61 47		
			Direct.	−61 13·9	E.S.E.	− 5	−35	−61 54		
27.	−39 14	182 54	Direct.	−60 24·6	S.E. by E.	−20	−35	−61 20		
			Def. N.	−59 12·0	S.E. by E.	−20	−81	−60 53		
			Def. S.	−60 30·1	S.E. by E.	−20	−35	−61 25		
			Mag. N.	−59 54·5	S.E. by E.	−20	−35	−60 50		Tolerably steady, steering well.
			Mag. N.S.	−59 55·1	S.E. by E.	−20	−35	−60 50		
			Mag. S.	−60 15·2	S.E. by E.	−20	−35	−61 10		
			Direct.	−60 31·5	S.E. by E.	−20	−35	−61 27		
	−39 15	183 02	Direct.	−59 41·2	S. by E. ½ E.	−56	−35	−61 12		Slight motion.
			Direct.	−59 41·8	S. ½ E.	−61	−35	−61 18	−61 15	
	−39 31	183 00	Direct.	−59 51·6	S. by E.	−60	−35	−61 27		Table steady.
			Def. N.	−59 13·4	S. by E.	−60	−81	−61 54		
			Def. S.	−59 59·5	S. by E.	−60	−35	−61 34		
			Mag. N.	−59 23·9	S. by E.	−60	−35	−60 59		
			Mag. N.S.	−59 30·9	S. by E.	−60	−35	−61 06		
			Mag. S.	−59 44·6	S. by E.	−60	−35	−61 20		
			Direct.	−59 55·0	S. by E.	−60	−35	−61 30		
28.	−40 35	183 00	Direct.	−61 14·0	E.S.E.	− 5	−35	−61 54		
			Direct.	−60 47·6	S.E.	−33	−35	−61 56		
			Def. N.	−59 58·5	S.E.	−33	−81	−61 53		
			Def. S.	−60 57·6	S.E.	−33	−35	−62 06		
			Mag. N.	−60 28·1	S.E.	−33	−35	−61 36		
			Mag. N.S.	−60 29·6	S.E.	−33	−35	−61 38		
			Mag. S.	−60 46·0	S.E.	−33	−35	−61 54		
			Direct.	−60 47·3	S.E.	−33	−35	−61 55	−61 56	
	−40 50	183 11	Direct.	−60 51·2	S.S.E. ½ E.	−48	−35	−62 14		
			Def. N.	−59 43·5	S.S.E. ½ E.	−48	−81	−61 53		
			Def. S.	−60 55·4	S.S.E. ½ E.	−48	−35	−62 18		
			Mag. N.	−60 13·9	S.S.E. ½ E.	−48	−35	−61 37		
			Mag. N.S.	−60 30·0	S.S.E. ½ E.	−48	−35	−61 53		
			Mag. S.	−60 30·1	S.S.E. ½ E.	−48	−35	−61 53		
			Direct.	−60 54·0	S.S.E. ½ E.	−48	−35	−62 17		Slight motion, steering well.

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Nov. 29.	−41 34	183 40	Direct.	−61 27·5	S. by E.	−60	−35	−63 03		Slight motion, steering well.
			Def. N.	−60 27·5	S. by E.	−60	−81	−62 49		
			Def. S.	−61 31·3	S. by E.	−60	−35	−63 06		
			Mag. N.	−61 37·1	S. by E.	−60	−35	−63 12	−62 57	
			Mag. N.S.	−61 03·5	S. by E.	−60	−35	−62 39		
			Mag. S.	−60 58·9	S. by E.	−60	−35	−62 34		
			Direct.	−61 44·5	S. by E.	−60	−35	−63 19		
	−42 40	183 46	Direct.	−62 23·7	S.	−64	−35	−64 03		
			Def. N.	−61 02·1	S.	−64	−81	−63 27		
			Def. S.	−62 08·6	S.	−64	−35	−63 48		
			Mag. N.	−61 54·9	S.	−64	−35	−63 34	−63 46	
			Mag. N.S.	−62 03·6	S.	−64	−35	−63 43		
			Mag. S.	−62 01·2	S.	−64	−35	−63 40		
			Direct.	−62 29·6	S.	−64	−35	−64 09		
30.	−43 33	183 10	Direct.	−63 26·2	S. ½ W.	−63	−35	−65 04		
			Def. N.	−62 29·3	S. ½ W.	−63	−81	−64 53		
			Def. S.	−63 58·6	S. ½ W.	−63	−35	−65 37		
			Mag. N.	−63 16·8	S. ½ W.	−63	−35	−64 55		Table steady, steering well.
			Mag. N.S.	−62 58·2	S. ½ W.	−63	−35	−64 36		
			Mag. S.	−63 46·3	S. ½ W.	−63	−35	−65 24		
			Direct.	−63 26·2	S. ½ W.	−63	−35	−65 04		
	−43 50	183 00	Direct.	−63 43·0	S. by W.	−62	−35	−65 20	−65 22	
	−44 15		Direct.	−64 07·3	S. by W.	−62	−35	−65 44		
			Def. N.	−63 29·4	S. by W.	−62	−81	−65 52		
			Def. S.	−63 59·7	S. by W.	−62	−35	−65 37		
			Mag. N.	−63 51·9	S. by W.	−62	−35	−65 29		Cross sea, motion slight.
			Mag. N.S.	−63 52·9	S. by W.	−62	−35	−65 30		
			Mag. S.	−63 58·1	S. by W.	−62	−35	−65 35		
			Direct.	−64 11·4	S. by W.	−62	−35	−65 48		
Dec. 1.	−45 30	183 12	Direct.	−65 46·1	S.E. by E.	−24	−35	−66 45		
			Def. N.	−65 01·6	S.E. by E.	−24	−81	−66 47		
			Def. S.	−65 19·5	S.E. by E.	−24	−35	−66 19		
			Mag. N.	−65 14·3	S.E. by E.	−24	−35	−66 13		
			Mag. N.S.	−65 31·7	S.E. by E.	−24	−35	−66 31		
			Mag. S.	−66 00·8	S.E. by E.	−24	−35	−67 00		
			Direct.	−65 40·0	S.E. by E.	−24	−35	−66 39		
	−45 48	183 25	Direct.	−65 43·9	S.E. ½ E.	−31	−35	−66 50	−66 43	Much pitching, steering well.
			Def. N.	−64 55·1	S.E. ½ E.	−31	−81	−66 47		
			Def. S.	−65 36·8	S.E. ½ E.	−31	−35	−66 43		
			Mag. N.	−65 54·2	S.E. ½ E.	−31	−35	−67 00		
			Mag. N.S.	−65 40·5	S.E. ½ E.	−31	−35	−66 47		
			Mag. S.	−65 49·2	S.E. ½ E.	−31	−35	−66 55		
			Direct.	−65 47·4	S.E. ½ E.	−31	−35	−66 53		
2.	−47 13	184 30	Direct.	−66 30·4	S.E. by E. ½ E.	−18	−35	−67 23		
			Def. N.	−65 41·8	S.E. by E. ½ E.	−18	−81	−67 21		
			Def. S.	−66 43·2	S.E. by E. ½ E.	−18	−35	−67 36		Ship pitching, but steering well.
			Mag. N.	−66 31·4	S.E. by E. ½ E.	−18	−35	−67 24		
			Mag. N.S.	−66 30·3	S.E. by E. ½ E.	−18	−35	−67 23		
			Mag. S.	−66 37·0	S.E. by E. ½ E.	−18	−35	−67 30		
			Direct.	−66 34·6	S.E. by E. ½ E.	−18	−35	−67 28		
	−47 39	184 55	Direct.	−66 54·4	S.E. by E.	−26	−35	−67 55	−67 32	
			Def. N.	−65 36·6	S.E. by E.	−26	−81	−67 24		
			Def. S.	−66 40·1	S.E. by E.	−26	−35	−67 41		
			Mag. N.	−66 21·5	S.E. by E.	−26	−35	−67 23		Very steady.
			Mag. N.S.	−66 35·4	S.E. by E.	−26	−35	−67 36		
			Mag. S.	−66 34·7	S.E. by E.	−26	−35	−67 36		
			Direct.	−66 47·4	S.E. by E.	−26	−35	−67 48		

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.	Remarks.
				° ′ ″		′	′	° ′	
Dec. 3.	−48 18	185 54	Direct.	−67 34·4	S.E. by E.	−27	−35	−68 36	
			Def. N.	−66 19·7	S.E. by E.	−27	−81	−68 08	
			Def. S.	−67 23·9	S.E. by E.	−27	−35	−68 26	
			Mag. N.	−67 17·7	S.E. by E.	−27	−35	−68 20	
			Mag. N.S.	−67 21·9	S.E. by E.	−27	−35	−68 24	
			Mag. S.	−67 17·1	S.E. by E.	−27	−35	−68 19	
			Direct.	−67 38·6	S.E. by E.	−27	−35	−68 41	
	−48 48	186 38	Direct.	−67 46·6	E.S.E.	−11	−35	−68 33	−68 40 Very steady.
	−49 05	186 54	Direct.	−68 01·5	S.E. by E. ½ E.	−19	−35	−68 56	
			Def. N.	−67 07·3	S.E. by E. ½ E.	−19	−81	−68 47	
			Def. S.	−67 55·0	S.E. by E. ½ E.	−19	−35	−68 49	
			Mag. N.	−67 49·5	S.E. by E. ½ E	−19	−35	−68 44	
			Mag. N.S.	−67 44·7	S.E. by E. ½ E.	−19	−35	−68 39	
			Mag. S.	−67 53·8	S.E. by E. ½ E.	−19	−35	−68 48	
			Direct.	−68 54·3	S.E. by E. ½ E.	−19	−35	−69 48	
4.	−49 24	187 23	Direct.	−68 53·5	N.E. by E.	+54	−35	−68 35	
			Direct.	−68 33·0	E. ½ N.	+26	−35	−68 42	
			Direct.	−68 29·8	E.	+20	−35	−68 45	
			Direct.	−68 42·3	E.N.E.	+45	−35	−68 32	Steady.
			Direct.	−68 28·7	W.S.W.	−12	−35	−69 16	
			Direct.	−68 45·7	W.	+20	−35	−69 01	
			Direct.	−68 52·2	E.	+20	−35	−69 07	
			Def. N.	−67 28·0	E.	+20	−81	−68 29	−68 59
			Direct.	−68 48·0	E. by S.	+ 4	−35	−69 19	
			Def. N.	−67 29·5	E. by S.	+ 4	−81	−68 47	
			Def. S.	−68 52·0	E. by S.	+ 4	−35	−69 23	
			Mag. N.	−68 29·0	E. by S.	+ 4	−35	−69 00	Swell from northward.
			Mag. N.S.	−68 28·1	E. by S.	+ 4	−35	−68 59	Table steady.
			Mag. S.	−68 42·7	E. by S.	+ 4	−35	−69 14	
			Direct.	−69 01·0	E. by S.	+ 4	−35	−69 32	
5.	−49 23	188 54	Direct.	−68 43·9	E. by S.	+ 4	−35	−69 15	
			Def. N.	−67 31·6	E. by S.	+ 4	−81	−68 49	
			Def. S.	−68 42·2	E. by S.	+ 4	−35	−69 13	
			Mag. N.	−68 42 6	E. by S.	+ 4	−35	−69 14	
			Mag. N.S.	−68 40·1	E. by S.	+ 4	−35	−69 11	
			Mag. S.	−68 30·6	E. by S.	+ 4	−35	−69 02	
			Direct.	−68 44·2	E. by S.	+ 4	−35	−69 15	−68 55 Table steady.
	−49 38	189 44	Direct.	−68 15·9	E. by S.	+ 4	−35	−68 47	
			Def. N.	−67 25·5	E. by S.	+ 4	−81	−68 43	
			Def. S.	−68 06·1	E. by S.	+ 4	−35	−68 37	
			Mag. N.	−67 57·8	E. by S.	+ 4	−35	−68 29	
			Mag. N.S.	−68 01·6	E. by S.	+ 4	−35	−68 33	
			Mag. S.	−68 22·7	E. by S.	+ 4	−35	−68 54	
			Direct.	−68 14·3	E. by S.	+ 4	−35	−68 45	
6.	−49 50	190 46	Direct.	−68 12·9	E. by S.	+ 4	−35	−68 44	
			Def. N.	−67 22·6	E. by S.	+ 4	−81	−68 40	
			Def. S.	−68 09·6	E. by S.	+ 4	−35	−68 41	
			Mag. N.	−68 07 4	E. by S.	+ 4	−35	−68 38	
			Mag. N.S.	−68 05·2	E. by S.	+ 4	−35	−68 36	
			Mag. S.	−68 21·5	E. by S.	+ 4	−35	−68 53	Swell from northward.
			Direct.	−68 16·3	E. by S.	+ 4	−35	−68 47	−68 43 Table steady.
	−50 02	191 21	Direct.	−68 09·8	E. by S.	+ 4	−35	−68 41	
	−50 08	191 39	Direct.	−68 17·0	E. by S.	+ 4	−35	−68 48	
			Def. N.	−67 22·2	E. by S.	+ 4	−81	−68 39	
			Def. S.	−68 16·8	E. by S.	+ 4	−35	−68 48	
			Mag. N.	−68 09·2	E. by S.	+ 4	−35	−68 40	
			Mag. N.S.	−68 08·4	E. by S.	+ 4	−35	−68 39	
			Mag. S.	−68 18·2	E. by S.	+ 4	−35	−68 49	

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
				° ′				° ′		
Dec. 7.	−50 32	191 52	Direct.	−68 24·2	S.E. by E.	−27	−35	−69 26		
			Def. N.	−67 47·4	S.E. by E.	−27	−81	−69 35		
			Def. S.	−68 18·1	S.E. by E.	−27	−35	−69 20		
			Mag. N.	−68 02·0	S.E. by E.	−27	−35	−69 04		
			Mag. N.S.	−67 50·3	S.E. by E.	−27	−35	−68 52		
			Mag. S.	−68 07·9	S.E. by E.	−27	−35	−69 10		
			Direct.	−68 28·1	S.E. by E.	−27	−35	−69 30	−69 25	Table steady.
	−50 45	192 19	Direct.	−68 31·2	S.E. ½ E.	−35	−35	−69 41		
			Def. N.	−67 31·3	S.E. ½ E.	−35	−81	−69 27		
			Def. S.	−68 08·4	S.E. ½ E.	−35	−35	−69 18		
			Mag. N.	−68 39·3	S.E. ½ E.	−35	−35	−69 49		
			Mag. N.S.	−68 30·9	S.E. ½ E.	−35	−35	−69 41		
			Mag. S.	−68 13·2	S.E. ½ E.	−35	−35	−69 23		
			Direct.	−68 30·3	S.E. ½ E.	−35	−35	−69 40		
8.	−51 37	194 00	Direct.	−69 18·9	E. by S.	+ 4	−35	−69 50		
			Def. N.	−68 23·8	E. by S.	+ 4	−81	−69 41		
			Def. S.	−69 20·4	E. by S.	+ 4	−35	−69 51		
			Mag. N.	−69 19·6	E. by S.	+ 4	−35	−69 51		
			Mag. N.S.	−69 13·8	E. by S.	+ 4	−35	−69 45		
			Mag. S.	−69 31·4	E. by S.	+ 4	−35	−70 02		
			Direct.	−69 22·4	E. by S.	+ 4	−35	−69 53		
			Direct.	−69 24·6	E. by S.	+ 4	−35	−69 56	−69 51	
	−52 00	194 53	Direct.	−69 29·8	E. by S.	+ 4	−35	−70 01		
			Def. N.	−68 30·1	E. by S.	+ 4	−81	−69 47		
			Def. S.	−69 17·1	E. by S.	+ 4	−35	−69 48		
			Mag. N.	−69 08·9	E. by S.	+ 4	−35	−69 40		
			Mag. N.S.	−69 11·7	E. by S.	+ 4	−35	−69 43		
			Mag. S.	−69 29·7	E. by S.	+ 4	−35	−70 01		Table steady, steering indifferently.
			Direct.	−69 27·0	E. by S.	+ 4	−35	−69 58		
9.	−52 14	197 49	Direct.	−69 41·0	E. by S.	+ 4	−35	−70 12		
			Def. N.	−68 37·6	E. by S.	+ 4	−81	−69 55		
			Def. S.	−69 29·3	E. by S.	+ 4	−35	−70 00		
			Mag. N.	−69 38·3	E. by S.	+ 4	−35	−70 09		
			Mag. N.S.	−69 56·9	E. by S.	+ 4	−35	−70 28		
			Mag. S.	−69 35·8	E. by S.	+ 4	−35	−70 07	−70 10	
			Direct.	−69 42·6	E. by S.	+ 4	−35	−70 14		
	−52 32	198 31	Direct.	−69 41·2	E. by S.	+ 4	−35	−70 12		Motion quick, steering wild.
10.	−53 01	202 16	Direct.	−69 47·1	E. by S.	+ 4	−35	−70 18		Strong wind, heavy sea.
			Mag. N.S.	−69 19·7	E. by S.	+ 4	−35	−69 51		Motion violent, steering well.
			Direct.	−69 56·5	E. by S.	+ 4	−35	−70 28		
11.	−52 51	203 56	Direct.	−69 53·3	E. ½ N.	+26	−35	−70 02		
			Def. N.	−68 59·6	E. ½ N.	+26	−81	−69 55		
			Def. S.	−69 59·1	E. ½ N.	+26	−35	−70 08		
			Mag. N.	−69 36·5	E. ½ N.	+26	−35	−69 45	−70 01	Head sea, table not very steady.
			Mag. N.S.	−69 30·2	E. ½ N.	+26	−35	−69 39		
			Mag. S.	−69 55·8	E. ½ N.	+26	−35	−70 05		
			Direct.	−70 04·7	E. ½ N.	+26	−35	−70 14		
			Direct.	−70 00·9	E. ½ S.	+12	−35	−70 24		
12.	−52 53	205 07	Direct.	−69 14·2	E.S.E.	−12	−35	−70 01		
			Def. N.	−67 53·9	E.S.E.	−12	−81	−69 27		
			Def. S.	−68 55·7	E.S.E.	−12	−35	−69 43		
			Mag. N.	−68 45·1	E.S.E.	−12	−35	−69 32		
			Mag. N.S.	−68 19·8	E.S.E.	−12	−35	−69 07		A head swell, steering well.
			Mag. S.	−68 53·5	E.S.E.	−12	−35	−69 41		
			Direct.	−69 16·4	E.S.E.	−12	−35	−70 03		
	−53 12	205 40	Direct.	−69 19·3	E.S.E.	−12	−35	−70 06	−69 52	

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections.		True Inclination.		Remarks.
						Ship's attraction.	Index.			
Dec. 12.	−53 31	206 14	Direct.	−69 18·8	E.S.E.	−12	−35	−70 06	−69 52	Table steady, steering wild.
			Def. N.	−68 07·1	E.S.E.	−12	−81	−69 40		
			Def. S.	−69 05·5	E.S.E.	−12	−35	−69 53		
			Mag. N.	−69 07·0	E.S.E.	−12	−35	−69 54		A slight motion, steering well.
			Mag. N.S.	−69 01·4	E.S.E.	−12	−35	−69 51		
			Mag. S.	−69 58·3	E.S.E.	−12	−35	−70 45		
			Direct.	−69 19·5	E.S.E.	−12	−35	−70 06		
13.	−54 19	208 24	Direct.	−69 18·1	E.S.E.	−12	−35	−70 05		
			Def. N.	−68 59·2	E.S.E.	−12	−81	−70 32		
			Def. S.	−69 02·6	E.S.E.	−12	−35	−69 50		
			Mag. N.	−69 16·0	E.S.E.	−12	−35	−70 03		
			Mag. N.S.	−69 16·0	E.S.E.	−12	−35	−70 03		
			Mag. S.	−69 14·0	E.S.E.	−12	−35	−70 01	−70 10	Table steady, steering wildly.
			Direct.	−69 16·6	E.S.E.	−12	−35	−70 04		
	−54 53	209 24	Direct.	−69 32·9	E.S.E.	−12	−35	−70 20		
			Def. N.	−68 59·0	E.S.E.	−12	−81	−70 32		
			Def. S.	−69 28·8	E.S.E.	−12	−35	−70 16		
			Mag. N.	−69 13·4	E.S.E.	−12	−35	−70 00		
			Mag. N.S.	−69 24·6	E.S.E.	−12	−35	−70 12		
			Mag. S.	−70 00·3	E.S.E.	−12	−35	−70 47		
			Direct.	−69 32·6	E.S.E.	−12	−35	−70 20		
			Direct.	−69 39·5	E.S.E.	−12	−35	−70 27		A heavy sea, ship steering badly.
			Def. N.	−68 55·8	E.S.E.	−12	−81	−70 29		
			Direct.	−68 52·9	S.E. by S.	−55	−35	−70 23		A swell from the N.W.
			Def. N.	−68 11·4	S.E. by S.	−55	−81	−70 27	−70 21	
			Def. S.	−68 27·0	S.E. by S.	−55	−35	−69 57		
			Mag. N.	−68 59·1	S.E. by S.	−55	−35	−70 29		
			Mag. N.S.	−68 46·1	S.E. by S.	−55	−35	−70 16		Ship tolerably steady.
			Mag. S.	−68 34·0	S.E. by S.	−55	−35	−70 04		
			Direct.	−68 52·1	S.E. by S.	−55	−35	−70 22		
14.	−56 14	211 43	Direct.	−70 08·2	S.E. by S.	−57	−35	−71 40		
			Def. N.	−69 12·9	S.E. by S.	−57	−81	−71 31		
			Def. S.	−70 10·1	S.E. by S.	−57	−35	−71 42		
			Mag. N.	−70 03·2	S.E. by S.	−57	−35	−71 35		
			Mag. N.S.	−70 06·2	S.E. by S.	−57	−35	−71 38		
			Mag. S.	−70 22·0	S.E. by S.	−57	−35	−71 54		
			Direct.	−70 16·1	S.E. by S.	−57	−35	−71 48	−71 41	Ship steady.
			Direct.	−70 17·8	S.E. by S.	−57	−35	−71 50		
			Def. N.	−69 11·7	S.E. by S.	−57	−81	−71 30		
			Def. S.	−70 12·1	S.E. by S.	−57	−35	−71 44		
			Mag. N.	−70 04·2	S.E. by S.	−57	−35	−71 36		
			Mag. N.S.	−70 00·2	S.E. by S.	−57	−35	−71 32		
			Mag. S.	−70 22·1	S.E. by S.	−57	−35	−71 54		
			Direct.	−70 17·2	S.E. by S.	−57	−35	−71 49		
	−56 30	211 50	Direct.	−70 19·5	S.E. by S.	−57	−35	−71 52		
			Def. N.	−69 29·1	S.E. by S.	−57	−81	−71 47		
			Def. S.	−70 12·7	S.E. by S.	−57	−35	−71 45		
			Mag. N.	−70 05·2	S.E. by S.	−57	−35	−71 37		
			Mag. N.S.	−69 59·7	S.E. by S.	−57	−35	−71 32		
			Mag. S.	−70 35·2	S.E. by S.	−57	−35	−72 07	−72 00	Ship steady.
			Direct.	−70 22·9	S.E. by S.	−57	−35	−71 55		
15.	−56 53	212 06	Direct.	−70 42·4	S.	−77	−35	−72 34		
			Direct.	−70 50·5	S. by E.	−75	−35	−72 40		
			Direct.	−70 27·5	S.S.E.	−69	−35	−72 12		
			Direct.	−70 30·8	S.E. by S.	−57	−35	−72 03		
			Def. N.	−69 33·8	S.E. by S.	−57	−81	−71 52		

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′ ″		′	′	° ′		
Dec. 15.	−56 53	212 06	Def. S.	−70 26·1	S.E. by S.	−57	−35	−71 58		
			Mag. N.	−70 12·5	S.E. by S.	−57	−35	−71 45		
			Mag. N.S.	−70 09·6	S.E. by S.	−57	−35	−71 42		
			Mag. S.	−70 34·0	S.E. by S.	−57	−35	−72 06		
			Direct.	−70 30·6	S.E. by S.	−57	−35	−72 03		
	−57 16	212 17	Direct.	−70 37·3	S.S.E.	−69	−35	−72 21	−72 14	Ship very steady.
			Def. N.	−70 00·6	S.S.E.	−69	−81	−72 31		
			Def. S.	−70 54·6	S.S.E.	−69	−35	−72 39		
			Mag. N.	−70 49·7	S.S.E.	−69	−35	−72 34		
			Mag. N.S.	−70 25·1	S.S.E.	−69	−35	−72 09		
			Mag. S.	−70 46·1	S.S.E.	−69	−35	−72 30		
			Direct.	−70 41·5	S.S.E.	−69	−35	−72 26		
16.	−57 44	212 59	Direct.	−71 03·3	S.S.E.	−70	−35	−72 48		
			Def. N.	−70 29·6	S.S.E.	−70	−81	−73 01		
			Def. S.	−71 08·2	S.S.E.	−70	−35	−72 53		
			Mag. N.	−71 09·6	S.S.E.	−70	−35	−72 55		
			Mag. N.S.	−71 02·8	S.S.E.	−70	−35	−72 48	−73 09	Ship steady, steering well.
			Mag. S.	−71 15·7	S.S.E.	−70	−35	−73 01		
			Direct.	−71 11·9	S.S.E.	−70	−35	−72 57		
	−58 28	213 08	Direct.	−71 56·4	S.S.E.	−70	−35	−73 41		
			Def. N.	−71 20·8	S.S.E.	−70	−81	−73 52		
			Def. S.	−71 52·3	S.S.E.	−70	−35	−73 37		
			Mag. N.	−71 39·7	S.S.E.	−70	−35	−73 25		
			Mag. N.S.	−71 23·9	S.S.E.	−70	−35	−73 09		
			Mag. S.	−71 59·3	S.S.E.	−70	−35	−73 44		
			Direct.	−72 04·4	S.S.E.	−70	−35	−73 49		
	−58 44	213 11	Direct.	−72 16·2	S.S.E.	−70	−35	−74 01		
			Def. N.	−71 24·5	S.S.E.	−70	−81	−73 56	−73 45	Ship steady, steering well.
			Def. S.	−72 22·6	S.S.E.	−70	−35	−74 08		
			Mag. N.	−71 57·1	S.S.E.	−70	−35	−73 42		
			Mag. N.S.	−71 47·8	S.S.E.	−70	−35	−73 33		
			Mag. S.	−72 01·3	S.S.E.	−70	−35	−73 46		
			Direct.	−72 16·1	S.S.E.	−70	−35	−74 01		
17.	−60 48	213 51	Direct.	−73 24·1	S.S.E.	−73	−35	−75 12		
			Def. N.	−72 33·2	S.S.E.	−73	−81	−75 07		
			Def. S.	−73 29·4	S.S.E.	−73	−35	−75 17		Slight motion, steering well.
			Mag. N.	−73 01·5	S.S.E.	−73	−35	−74 49		
			Mag. N.S.	−73 04·2	S.S.E.	−73	−35	−74 52		
			Mag. S.	−73 31·1	S.S.E.	−73	−35	−75 19		
			Direct.	−73 28·8	S.S.E.	−73	−35	−75 17		
	−61 37	213 54	Direct.	−74 10·9	S. ½ E.	−81	−35	−76 07	−75 32	
			Def. N.	−73 06·9	S. ½ E.	−81	−81	−75 49		
			Def. S.	−73 59·8	S. ½ E.	−81	−35	−75 56		
			Mag. N.	−73 52·8	S. ½ E.	−81	−35	−75 49		Ship steady,
			Mag. N.S.	−73 39·5	S. ½ E.	−81	−35	−75 36		
			Mag. S.	−74 08·6	S. ½ E.	−81	−35	−76 05		
			Direct.	−74 13·1	S. ½ E.	−81	−35	−76 09		
18.	−62 34	212 34	Direct.	−74 51·6	S. by E.	−79	−35	−76 46		
			Def. N.	−73 48·3	S. by E.	−79	−81	−76 28		
			Def. S.	−74 43·7	S. by E.	−79	−35	−76 38		
			Mag. N.	−74 23·1	S. by E.	−79	−35	−76 17	−76 37	Ship steady, sailing amongst loose ice.
			Mag. N.S.	−74 23·9	S. by E.	−79	−35	−76 18		
			Mag. S.	−74 38·9	S. by E.	−79	−35	−76 33		
			Direct.	−74 46·1	S. by E.	−79	−35	−76 40		
	−62 51	212 50	Direct.	−75 20·5	S. by W.	−79	−35	−77 14		

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′				° ′	° ′	
Dec. 19.	−63 06	210 55	Direct.	−75 52·3	s.s.w.	−74	−35	−77 41		
			Direct.	−75 45·3	s. by w.	−80	−35	−77 40		
			Def. N.	−74 56·9	s. by w.	−80	−81	−77 38		
			Def. S.	−75 35·6	s. by w.	−80	−35	−77 31		
			Mag. N.	−75 24·5	s. by w.	−80	−35	−77 20		
			Mag. N.S.	−75 21·2	s. by w.	−80	−35	−77 16	−77 37	Ship steady, sailing amongst loose ice.
			Mag. S.	−75 37·8	s. by w.	−80	−35	−77 33		
			Direct.	−75 51·8	s. by w.	−80	−35	−77 47		
	−63 21	209 55	Direct.	−76 08·3	s.w. by s.	−62	−35	−77 45		
			Direct.	−76 00·0	s.s.w. ½ w.	−68	−35	−77 43		
			Direct.	−77 00·8	w. by s. ½ s.	−12	−35	−77 48		
			Direct.	−76 36·2	s.w. by w. ½ w.	−25	−35	−77 36		
20.	−63 36	208 20	Direct.	−76 13·7	s.s.w.	−74	−35	−78 03		
			Def. N.	−75 10·8	s.s.w.	−74	−81	−77 46		
			Def. S.	−76 04·8	s.s.w.	−74	−35	−77 54		
			Mag. N.	−75 45·5	s.s.w.	−74	−35	−77 35		
			Mag. N.S.	−75 44·8	s.s.w.	−74	−35	−77 34	−77 53	Ship steady, steering amongst loose ice.
			Mag. S.	−76 08·0	s.s.w.	−74	−35	−77 57		
			Direct.	−76 01·3	s. by w.	−80	−35	−77 56		
			Direct.	−76 24·9	s.w. by s.	−62	−35	−78 02		
			Direct.	−76 00·4	s.	−82	−35	−77 57		
			Direct.	−76 45·2	s.w.	−49	−35	−78 09		
			Direct.	−76 24·3	s.w. by s.	−62	−35	−78 01		
			Direct.	−76 45·5	s.w.	−49	−35	−78 10		
	−63 53	208 32	Direct.	−76 06·9	s.	−82	−35	−78 04		
			Def. N.	−75 01·3	s.	−82	−81	−77 44		
			Def. S.	−75 53·4	s.	−82	−35	−77 50	−77 56	Ship steady, steering amongst loose ice.
			Mag. N.	−75 44·5	s.	−82	−35	−77 42		
			Mag. N.S.	−75 36·8	s.	−82	−35	−77 34		
			Mag. S.	−75 57·7	s.	−82	−35	−77 55		
			Direct.	−76 08·9	s.	−82	−35	−78 06		
			Direct.	−76 15·3	s. by w.	−80	−35	−78 10		
21.	−64 11	206 35	Direct.	−76 32·9	s.s.w.	−75	−35	−78 23		
			Def. N.	−75 31·5	s.s.w.	−75	−81	−78 08		
			Def. S.	−76 29·6	s.s.w.	−75	−35	−78 20		
			Mag. N.	−76 10·0	s.s.w.	−75	−35	−78 00		
			Mag. N.S.	−76 01·2	s.s.w.	−75	−35	−77 51		
			Mag. S.	−76 00·8	s.s.w.	−75	−35	−77 51		
			Direct.	−76 43·1	s. ½ e.	−82	−35	−78 40	−78 30	Ship steady, sailing amongst loose ice.
			Direct.	−76 32·7	s. by e.	−81	−35	−78 29		
			Direct.	−76 41·8	s. by e. ½ e.	−78	−35	−78 35		
	−64 51	206 19	Direct.	−77 03·2	s. ½ e.	−82	−35	−79 00		
			Direct.	−77 06·4	s. by w.	−81	−35	−79 02		
			Def. N.	−76 06·6	s. by w.	−81	−81	−78 49		
			Def. S.	−77 02·2	s. by w.	−81	−35	−78 58		
			Direct.	−77 04·7	s. by w.	−81	−35	−79 01		
22.	−65 19	205 08	Direct.	−77 29·4	s. ½ w.	−83	−35	−79 27		
			Def. N.	−76 37·6	s. ½ w.	−83	−81	−79 22		
			Def. S.	−77 20·3	s. ½ w.	−83	−35	−79 18		
			Mag. N.	−77 08·4	s. ½ w.	−83	−35	−79 06		
			Mag. N.S.	−76 59·9	s. ½ w.	−83	−35	−78 58		
			Mag. S.	−77 30·4	s. ½ w.	−83	−35	−79 28		
			Direct.	−77 28·6	s. ½ w.	−83	−35	−79 27		
			Direct.	−77 26·4	s.	−84	−35	−79 25		
	−65 34	205 00	Direct.	−77 27·8	s.	−84	−35	−79 27		
			Def. N.	−76 20·5	s.	−84	−81	−79 05	−79 16	Sailing amongst loose ice, very steady.

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
Dec. 22.	−65° 34′	205° 00′	Def. S.	−77° 14′·7	S.	−8′·4	−35′	−79° 14′	−79° 16′	Sailing amongst loose ice, very steady.
			Mag. N.	−77 04·0	S.	−8·4	−35	−79 03		
			Mag. N.S.	−76 53·3	S.	−8·4	−35	−78 52		
			Mag. S.	−77 23·6	S.	−8·4	−35	−79 23		
			Direct.	−77 30·4	S. ¾ W.	−8·2	−35	−79 27		
23.	−65 47	204 19	Direct.	−79 54·8	N.E.	+6·9	−35	−79 21		
			Direct.	−79 45·9	N.E. ½ E.	+6·4	−35	−79 17		
			Direct.	−79 30·8	N.E. by E.	+5·9	−35	−79 07		
			Direct.	−77 34·8	S.	−8·4	−35	−79 34		
			Def. N.	−76 44·1	S.	−8·4	−81	−79 29		
			Direct.	−79 12·3	E. by N.	+3·2	−35	−79 15		
			Def. S.	−79 04·9	E. by N.	+3·2	−35	−79 08	−79 26	Sailing amongst loose ice, very steady.
			Mag. N.S.	−78 44·5	E. by N.	+3·2	−35	−78 48		
			Mag. S.	−77 15·9*	E. by N.	+3·2	−35	−77 19		
			Direct.	−78 10·8	S.W. ¼ S.	−5·5	−35	−79 41		
			Direct.	−77 46·2	S. by W.	−8·2	−35	−79 43		
			Def. N.	−77 23·0	S. by W.	−8·2	−81	−80 06		
			Direct.	−77 45·1	S. ¼ W.	−8·3	−35	−79 43		
			Direct.	−77 44·6	S. ¼ W.	−8·2	−35	−79 42		
			Direct.	−77 57·6	S.S.W.	−7·6	−35	−79 49		
			Direct.	−77 34·4	S.	−8·4	−35	−79 33		
			Direct.	−79 51·1	N.E. ½ E.	+6·3	−35	−79 23		
			Direct.	−79 57·6	N.E.	+6·9	−35	−79 24		
			Direct.	−79 32·1	N.E. by E. ½ E.	+5·2	−35	−79 15		
			Direct.	−78 18·6	S.E. by E. ½ E.	−2·7	−35	−79 21	−79 28	Sailing amongst loose ice, very steady.
			Direct.	−78 14·3	S.E. by E.	−3·6	−35	−79 25		
			Direct.	−78 23·0	E.S.E.	−1·7	−35	−79 15		
			Direct.	−80 26·0	N.	+8·6	−35	−79 35		
			Direct.	−80 03·9	N.E. by N.	+7·5	−35	−79 24		
			Direct.	−80 11·6	N.N.E.	+8·1	−35	−79 26		
			Direct.	−80 19·4	N. by E.	+8·5	−35	−79 29		
24.	−65 50	204 08	Direct.	−80 31·9	N. by W.	+8·5	−35	−79 42		
			Direct.	−80 28·8	N. by W.	+8·5	−35	−79 39		
			Def. N.	−79 26·9	N. by W.	+8·5	−81	−79 23		
			Mag. S.	−80 21·4	N. by W.	+8·5	−35	−79 31		
			Mag. N.	−80 08·5	N. by W.	+8·5	−35	−79 19		
			Mag. N.S.	−80 00·0	N. by W.	+8·5	−35	−79 10	−79 30	Ship fast to a piece of ice.
			Direct.	−80 01·8	N.E.	+6·9	−35	−79 28		
			Mag. S.	−79 50·6	N.E.	+6·9	−35	−79 17		
			Direct.	−80 29·6	N.N.W.	+8·1	−35	−79 44		
			Direct.	−80 29·2	N.W.	+6·9	−35	−79 55		
			Direct.	−79 01·3	E.	+1·6	−35	−79 19		
25.	−66 01	204 00	Direct.	−79 09·2	E. by N.	+3·2	−35	−79 12		
			Direct.	−78 56·5	E. ¼ S.	+0·4	−35	−79 28		
			Direct.	−80 31·4	N.W. ½ N.	+7·0	−35	−79 56		
			Direct.	−78 39·0	E. by S. ¼ S.	−1·2	−35	−79 26		
26.	−65 57	204 27	Direct.	−80 39·4	N. by W.	+8·5	−35	−79 49	−79 39	Sailing amongst ice, very steady.
			Direct.	−80 31·5	N.W. ¾ W.	+6·1	−35	−80 06		
			Direct.	−78 21·3	S.E.	−5·1	−35	−79 47		
			Direct.	−78 39·0	E.S.E.	−1·8	−35	−79 32		
27.	−66 08	203 50	Direct.	−78 44·5	E.S.E.	−1·8	−35	−79 37		
			Direct.	−79 00·2	E. by S.	−0·1	−35	−79 36		
			Def. N.	−77 37·7	E.S.E.	−1·8	−81	−79 17		
			Def. S.	−78 30·0	E.S.E.	−1·8	−35	−79 23		
			Direct.	−80 38·3	N.W. by N.	+7·5	−35	−79 58	−79 39	Sailing amongst ice, very steady.

* The result is omitted in the mean, as it differs so widely from all others of the same period.

Observations of Inclination. (Continued.)

1841.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
Dec. 27.	−66 08	203 50	Mag. N.	−80 16·1	N.W. by N.	+75	−35	−79 36	−79 39	Sailing amongst ice, very steady.
			Mag. N.S.	−79 58·1	N.W. by N.	+75	−35	−79 18		
			Mag. S.	−80 34·0	N.W. by N.	+75	−35	−79 54		
			Direct.	−78 03·0	S. by E.	−83	−35	−80 01		
			Direct.	−78 21·3	S.E.	−52	−35	−79 48		
28.	−66 10	202 54	Direct.	−80 00·0	W. by N.	+32	−35	−80 03		
			Def. N.	−78 52·8	W. by N.	+32	−81	−79 42		
	−66 11	202 54	Direct.	−80 50·2	N. ½ W.	+85	−35	−80 00		
			Direct.	−78 29·2	S.W. by S.	−65	−35	−80 09		
29.	−66 20	203 20	Direct.	−79 22·8	E.	+16	−35	−79 42		
			Direct.	−80 44·3	N.W. ½ W.	+64	−35	−80 15		
			Direct.	−80 47·6	N.W.	+69	−35	−80 14	−80 01	
			Direct.	−79 26·8	E. ½ N.	+24	−35	−79 38		Sailing amongst ice, very steady.
30.	−66 25	203 12	Direct.	−79 24·7	E. by S.	0	−35	−80 00		
			Direct.	−81 13·2	N. W. by N.	+75	−35	−80 33		
			Direct.	−79 45·3	E.	+16	−35	−80 04		
			Direct.	−79 59·8	E. by N.	+32	−35	−80 03		
			Direct.	−80 09·2	E.N.E.	+46	−35	−79 58		
			Direct.	−80 14·0	N.E. by E. ½ E.	+52	−35	−79 57		
31.	−66 30	203 08	Direct.	−81 15·6	N. by W.	+85	−35	−80 26		Fast to a piece of ice: Erebus fast to the same piece distant fifty yards. Terror's head to North *, Erebus bearing E.
			Direct.	−81 17·6	N. ½ W.	+85	−35	−80 28		
			Direct.	−81 15·5	N.	+86	−35	−80 25		
			Direct.	−81 10·2	N. ½ E	+85	−35	−80 20		
			Direct.	−81 11·8	N. by E.	+85	−35	−80 22		
			Direct.	−80 28·6	W. ½ N.	+24	−35	−80 40		Ditto; Erebus N.
1842.										
Jan. 1.	−66 36	203 29	Direct.	−81 14·8	N.W. ½ W.	+64	−35	−80 46		
			Def. N.	−80 22·2	N.W. ½ W.	+64	−81	−80 39		
			Def. S.	−81 06·3	N.W. ½ W.	+64	−35	−80 37		
			Mag. N.	−81 03·7	N.W. ½ W.	+64	−35	−80 34		Ditto; Erebus N.E.
			Mag. N.S.	−80 50·7	N.W. ½ W.	+64	−35	−80 22		
			Mag. S.	−81 01·3	N.W. ½ W.	+64	−35	−80 32		
			Direct.	−81 15·4	N.W. ½ W.	+64	−35	−80 46		
2.	−66 36	203 14	Direct.	−81 12·4	N. ½ W.	+85	−35	−80 22		Ditto; Erebus E.
3.	−66 32	203 23	Direct.	−78 46·1	S.E.	−52	−35	−80 13		
			Direct.	−78 26·1	S. by W.	−83	−35	−80 24		
			Direct.	−78 29·6	S. by W. ½ W.	−80	−35	−80 25	−80 03	
5.	−66 14	203 17	Direct.	−79 36·7	E. ½ S.	+ 8	−35	−80 04		Running amongst loose ice, very steady.
6.	−66 09	203 58	Direct.	−77 46·2	S. ½ W.	−83	−35	−79 44		
			Direct.	−80 15·8	N. ½ E.	+85	−35	−79 26		
7.	−66 20	203 39	Direct.	−80 31·9	N.W.	+69	−35	−79 58		
			Def. N.	−79 32·1	N.W.	+69	−81	−79 44		
			Def. S.	−80 26·2	N.W.	+69	−35	−79 52		
			Mag. N.	−80 15·7	N.W.	+69	−35	−79 42		
			Mag. N.S.	−80 05·8	N.W.	+69	−35	−79 32	−79 52	Running amongst loose ice, very steady.
			Mag. S.	−80 34·5	N.W.	+69	−35	−80 01		
			Direct.	−80 37·9	N.W.	+69	−35	−80 04		
			Direct.	−79 53·0	S.	−85	−35	−79 53		
			Direct.	−78 00·9	S. by E.	−83	−35	−79 59		
8.	−66 05	204 02	Direct.	−78 15·2	S. by W. ½ W.	−80	−35	−80 10		
			Direct.	−80 44·1	N.	+86	−35	−79 53		
			Def. N.	−79 45·4	N.	+86	−81	−79 40		
			Def. S.	−80 41·6	N.	+86	−35	−79 51		Running amongst loose ice, very steady.
			Mag. N.	−80 27·8	N.	+86	−35	−79 37	−79 51	

* These observations are omitted in the general table of results, and in the map: the proximity of the two ships appears however to have produced scarcely any sensible effect on the inclination needle.

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
Jan. 8.	−66 05	204 02	Mag. N.S.	−80 20·7	N.	+86	−35	−79 30	−79 51	Running amongst loose ice, very steady.
			Mag. S.	−80 46·2	N.	+86	−35	−79 55		
			Direct.	−80 45·4	N.	+86	−35	−79 54		
			Direct.	−78 00·6	S. by E.	−83	−35	−79 59		
			Direct.	−78 25·8	S.W. by S.	−65	−35	−80 06		
			Direct.	−80 40·4	N. by W.	+85	−35	−79 50		
			Direct.	−80 43·1	N.	+86	−35	−79 52		
			Direct.	−79 10·0	E. ¼ S.	+ 8	−35	−79 37		
			Direct.	−77 56·0	S.	−85	−35	−79 56		
9.	−66 01	204 04	Direct.	−78 58·2	E. by S.	− 1	−35	−79 34		
			Direct.	−79 22·2	E. ¼ N.	+20	−35	−79 37		
			Direct.	−78 46·0	S.W. by W.	−36	−35	−79 57		
			Direct.	−78 33 8	S.W. ½ W.	−44	−35	−79 53		
			Def. N.	−77 34·8	S.W. ½ W.	−44	−81	−79 40		
			Direct.	−78 36·3	S.W.	−52	−35	−80 03		
			Direct.	−79 00·8	W.S.W.	−18	−35	−79 54	−79 50	
			Def. S.	−79 10·9	W.S.W.	−18	−35	−80 04		
			Mag. N.	−78 28·8	S.W. by W.	−36	−35	−79 40		
			Mag. N.S.	−78 24·4	S.W. by W.	−36	−35	−79 35		
			Mag. S.	−78 48·6	S.W. by W.	−36	−35	−80 00		
			Direct.	−78 45·2	S.W. by W.	−36	−35	−79 56		
10.	−65 57	203 56	Direct.	−79 03·7	W.S.W.	−18	−35	−79 57		Running amongst loose ice, very steady.
			Direct.	−79 30·4	W. by S.	− 1	−35	−80 06		
			Def. N.	−78 23·7	W. by S.	− 1	−81	−79 46		
			Def. S.	−79 14·9	W. by S.	− 1	−35	−79 51		
			Mag. N.	−79 17·4	W. by S.	− 1	−35	−79 53		
			Direct.	−79 15·1	E.	+16	−35	−79 34		
			Mag. S.	−79 17·6	E.	+16	−35	−79 37		
			Mag. N.S.	−78 55·2	E.	+16	−35	−79 14	−79 47	
			Direct.	−79 15·7	E.	+16	−35	−79 35		
			Direct.	−78 29·0	S.E. by E. ½ E.	−27	−35	−79 31		
			Direct.	−79 41·5	W. ¼ S.	+12	−35	−80 05		
	−65 58	203 37	Direct.	−79 23·8	W. by S. ½ S.	− 8	−35	−80 07		
			Direct.	−78 44·5	S.W. by W.	−36	−35	−79 55		
			Direct.	−78 46·3	S.W. by W.	−36	−35	−79 57		
11.	−65 56	203 31	Direct.	−77 58·3	S. by E.	−83	−35	−79 56		
			Direct.	−77 53·2	S.	−85	−35	−79 53		
			Def. N.	−76 51·8	S.	−85	−81	−79 58		
			Def. S.	−77 56·7	S.	−85	−35	−79 57		
			Mag. N.	−77 31·0	S.	−85	−35	−79 31		
			Mag. N.S.	−77 35·4	S.	−85	−35	−79 35	−79 51	
			Mag. S.	−77 49·3	S.	−85	−35	−79 49		
12.	−65 45	203 23	Direct.	−78 30·4	S.W.	−52	−35	−79 57		
			Direct.	−78 20·6	S.W. by S.	−65	−35	−80 01		
			Direct.	−78 44·4	S.W. by W.	−36	−35	−79 55		
13.	−66 06	202 10	Direct.	−78 13·7	S. by W.	−82	−35	−80 11		
			Direct.	−77 50·3	S.	−84	−35	−79 49		Very steady, working about in a hole of water.
	−66 12	202 12	Direct.	−80 22·0	N.N.E.	+81	−35	−79 36		
			Direct.	−80 46·2	N.	+86	−35	−79 55		
			Direct.	−80 38·4	N. ¼ E.	+85	−35	−79 48		
			Def. N.	−79 44·5	N. ½ E.	+85	−81	−79 41		
			Def. S.	−80 39·1	N. ½ E.	+85	−35	−79 49	−79 48	
			Mag. N.	−80 22·8	N. ½ E.	+85	−35	−79 33		
			Mag. N.S.	−80 20·0	N. ½ E.	+85	−35	−79 30		
			Mag. S.	−80 37·4	N. ½ E.	+85	−35	−79 47		
			Direct.	−80 39·8	N. ½ E.	+85	−35	−79 50		
			Direct.	−78 07·0	S.S.E.	−77	−35	−79 59		
			Direct.	−77 58·2	S.	−85	−35	−79 58		

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Jan. 14.	−66 08	201 46	Direct.	−77 58·8	S.	−85	−35	−79 59		
			Direct.	−78 09·0	S. by .E	−83	−35	−80 07		
			Direct.	−80 23·5	N.N.E.	+81	−35	−79 38		
			Direct.	−80 20·4	N.E.	+69	−35	−79 46		
			Direct.	−79 51·7	N.E. by E.	+59	−35	−79 28		
			Def. N.	−79 01·7	N.E. by E.	+59	−81	−79 24	−79 35	
			Def. S.	−80 00·4	N.E. by E.	+59	−35	−79 36		
			Mag. N.	−79 39·7	N.E. by E.	+59	−35	−79 16		
			Mag. N.S.	−79 28·8	N.E. by E.	+59	−35	−79 05		
			Mag. S.	−80 17·5	N.N.E.	+81	−35	−79 32		
			Direct.	−80 22·0	N.N.E.	+81	−35	−79 36		
15.	−65 59	202 22	Direct.	−78 45·5	E.S.E.	−18	−35	−79 39		Very steady, working about in a hole of water.
	−65 58	202 21	Direct.	−79 19·4	E.	+16	−35	−79 38		
			Direct.	−78 31·4	S.W. by S.	−65	−35	−80 11		
			Direct.	−78 45·9	E.S.E.	−18	−35	−79 39		
16.	−65 47	202 08	Direct.	−79 23·8	E.	+16	−35	−79 43		
			Def. N.	−78 32·3	E.	+16	−81	−79 37		
			Def. S.	−79 13·2	E.	+16	−35	−79 32	−79 38	
			Mag. N.	−79 06·4	E.	+16	−35	−79 25		
			Mag. N.S.	−79 00·0	E.	+16	−35	−79 19		
			Mag. S.	−79 19·3	E.	+16	−35	−79 38		
			Direct.	−79 23·4	E.	+16	−35	−79 42		
			Direct.	−79 25·3	E.	+16	−35	−79 44		
17.	−65 47	201 56	Direct.	−80 05·9	N.E.	+69	−35	−79 32		Fast to a piece of ice.
19.	−66 11	200 45	Direct.	−80 55·9	N.	+86	−35	−80 05		
			Direct.	−80 50·3	N. by E. $\frac{3}{4}$ E.	+82	−35	−80 03		Ship steady.
			Direct.	−78 47·2	S.S.W. $\frac{1}{2}$ W.	−71	−35	−80 33		
20.	−67 37	200 12	Direct.	−79 51·6	W. by S.	− 1	−35	−80 28		
			Direct.	−80 25·6	W. by N.	+32	−35	−80 29		
			Direct.	−80 03·1	W.	+16	−35	−80 22		Long swell, ship striking heavily against pieces of ice.
			Direct.	−80 47·6	N. by E.	+85	−35	−79 58	−80 22	
			Direct.	−80 59·8	N. by E. $\frac{1}{2}$ E.	+83	−35	−80 12		
			Direct.	−78 26·8	S. by W.	−83	−35	−80 25		
21.	−66 43	202 50	Direct.	−78 44·7	S.S.W.	−77	−35	−80 37		
			Direct.	−78 38·3	S. by W.	−83	−35	−80 36		Swell from W.N.W.
			Direct.	−78 35·4	S.	−85	−35	−80 35		
26.	−67 12	203 12	Direct.	−80 12·8	E. by N.	+32	−35	−80 16		
			Def. N.	−79 15·3	E. by N.	+32	−81	−80 04		
			Def. S.	−80 14·2	E. by N.	+32	−35	−80 17		
			Mag. N.	−80 07·4	E. by N.	+32	−35	−80 10		
			Mag. N.S.	−79 55·1	E. by N.	+32	−35	−79 58		
			Direct.	−80 03 0	E.	+16	−35	−80 22	−80 06*	Both ships made fast to a piece of ice; Erebus N. by W., distant 30 fathoms.
			Direct.	−78 54·4	S.E. by E.	−36	−35	−80 05		
			Mag. N.S.	−78 23·2	S.E. by E.	−36	−35	−79 34		
			Mag. S.	−78 46·7	S.E. by E.	−36	−35	−79 58		
			Direct.	−79 28·2	E.S.E.	−18	−35	−80 21		
28.	−67 46	204 17	Direct.	−80 38·8	E. by N.	+32	−35	−80 42		
			Def. N.	−79 40·5	E. by N.	+32	−81	−80 30		
			Def. S.	−81 31·3	N.	+86	−35	−80 40		
			Direct.	−80 46·1	E.N.E.	+46	−35	−80 35		
			Direct.	−81 45·8	N. by E.	+85	−35	−80 56		
			Def. N.	−81 02·7	N. by E.	+85	−81	−81 07		
			Direct.	−81 31·0	N.N.E.	+81	−35	−80 45		
			Def. N.	−80 43·8	N.N.E.	+81	−81	−80 44		Swell from W.S.W. Table steady.
			Mag. N.	−81 24·4	N.N.E.	+81	−35	−80 38	−80 43	

* Omitted in the Map, in consequence of the vicinity of the other ship.

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
Jan. 28.	−67° 46′	204° 17′	Mag. N.S.	−81° 16′·6	N.N.E.	+81′	−35′	−80° 31′	−80° 43′	Table steady.
			Mag. S.	−81 25·2	N.N.E.	+81	−35	−80 39		
			Direct.	−79 06·5	S. ¾ W.	−84	−35	−81 06		
			Def. N.	−78 00·0	S. ¾ W.	−84	−81	−80 45		
			Def. S.	−78 38·0	S. ¾ W.	−84	−35	−80 37		
			Mag. N.	−78 36·0	S. ¾ W.	−84	−35	−80 35		
			Mag. N.S.	−78 32·1	S. ¾ W.	−84	−35	−80 31		
			Mag. S.	−78 45·8	S. ½ W.	−84	−35	−80 45		
			Direct.	−79 04·5	S. ¼ W.	−84	−35	−81 04		
			Direct.	−81 39·3	N.	+86	−35	−80 48		
			Direct.	−81 42·2	N. by W. ¾ W.	+83	−35	−80 54		
			Direct.	−81 47·6	N. by W. ½ W.	+84	−35	−81 00		
			Direct.	−78 47·4	S. ½ E.	−84	−35	−80 46		
			Direct.	−78 50·6	S. ¾ E.	−84	−35	−80 50	−80 48	
	−67 48	204 18	Direct.	−79 45·4	S.W. by W.	−36	−35	−80 56		
			Direct.	−80 40·8	W.	+16	−35	−81 00		
			Direct.	−81 31·5	N.W. by W.	+59	−35	−81 08		
			Direct.	−80 15·3	E.	+16	−35	−80 34		Very steady.
			Direct.	−80 01·3	E. by S.	− 1	−35	−80 37		
			Direct.	−79 46·6	E.S.E.	−18	−35	−80 40		
			Direct.	−80 31·9	E. by N.	+32	−35	−80 35		
29.	−67 24	204 05	Direct.	−80 38·5	E.N.E.	+46	−35	−80 28		
			Direct.	−79 10·2	S. by W.	−83	−35	−81 08		
			Def. N.	−78 06·9	S. by W.	−83	−81	−80 51		
			Def. S.	−78 44·1	E.N.E.	+46	−35			
			Mag. N.	−78 38·6	E.N.E.	+46	−35	*		
			Mag. N.S.	−78 33·9	E.N.E.	+46	−35			
31.	−67 12	202 24	Direct.	−78 59·8	S.S.W.	−77	−35	−80 52		
			Def. N.	−78 07·9	S.S.W.	−77	−81	−80 46	−80 44	Strong breeze, steady.
			Def. S.	−78 55·8	S.S.W.	−77	−35	−80 48		
			Mag. N.	−78 36·9	S.S.W.	−77	−35	−80 29		
			Mag. N.S.	−78 29·0	S.S.W.	−77	−35	−80 21		
			Mag. S.	−79 07·7	S.S.W.	−77	−35	−81 00		
			Direct.	−79 23·3	S.W.	−52	−35	−80 50		
			Def. N.	−78 09·4	S.W.	−52	−81	−80 22		
			Direct.	−79 15·3	S.W. by S.	−65	−35	−80 55		
			Def. N.	−78 23·5	S.W. by S.	−65	−81	−80 50		
Feb. 1.	−67 12	201 34	Direct.	−80 15·5	W. by S.	− 1	−35	−80 52		
			Def. N.	−79 14·5	W. by S.	− 1	−81	−80 37		
			Direct.	−80 06·5	E.	+17	−35	−80 25		
			Def. N.	−79 05·2	E.	+17	−81	−80 09		Ship steady, ice all around.
			Direct.	−79 29·1	E.S.E.	−18	−35	−80 22		
			Direct.	−80 25·9	W.	+17	−35	−80 44		
	−67 16		Direct.	−79 51·9	W.S.W.	−18	−35	−80 45		
			Direct.	−78 58·6	S.S.W.	−77	−35	−80 51		
			Def. N.	−77 59·0	S.S.W.	−77	−81	−80 31	−80 35	Table steady.
			Def. S.	−78 53·6	S.S.W.	−77	−35	−80 46		
			Mag. N.	−78 32·1	S.S.W.	−77	−35	−80 24		
			Mag. N.S.	−78 30·2	S.S.W.	−77	−35	−80 22		
			Mag. S.	−78 49·0	S.S.W.	−77	−35	−80 41		
			Direct.	−79 00·8	S.S.W.	−77	−35	−80 53		
			Direct.	−81 30·0	N. ¾ W.	+86	−35	−80 39		
			Def. N.	−80 37·0	N. ¾ W.	+86	−81	−80 32		
			Direct.	−79 08·1	S.W.	−52	−35	−80 35		
			Def. N.	−78 11·1	S.W.	−52	−81	−80 24		

* Omitted in the mean; apparently the degree should have been written 80 instead of 78.

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
				° ′		′	′	° ′	° ′	
Feb. 2.	−67 56	199 48	Direct.	−79 28·6	s. by w.	−83	−35	−81 27		
			Def. N.	−78 37·8	s. by w.	−83	−81	−81 22		
			Def. S.	−79 15·1	s. by w.	−83	−35	−81 13		
			Mag. N.	−78 53·6	s. by w.	−83	−35	−80 52		
			Mag. N.S.	−79 07·5	s. by w.	−83	−35	−81 06		
			Mag. S.	−79 26·9	s. by w.	−83	−35	−81 25		
			Direct.	−79 27·4	s. by w.	−83	−35	−81 25		
3.	−68 21	200 06	Direct.	−79 34·2	s.s.w.	−77	−35	−81 26	−81 18	Table steady.
			Def. N.	−78 31·9	s.s.w.	−77	−81	−81 10		
			Def. S.	−79 26·7	s.s.w.	−77	−35	−81 19		
			Mag. N.	−79 24·2	s.s.w.	−77	−35	−81 16		
			Mag. N.S.	−79 23·4	s.s w.	−77	−35	−81 15		
			Mag. S.	−79 28·6	s.s.w.	−77	−35	−81 21		
			Direct.	−79 36·1	s.s.w.	−77	−35	−81 28		
4.	−68 45	199 41	Direct.	−79 32·5	s.	−85	−35	−81 33		
			Def. N.	−78 50·3	s.	−85	−81	−81 36		
			Def. S.	−79 36·6	s.	−85	−35	−81 37		
			Mag. N.	−79 17·2	s.	−85	−35	−81 17		
			Mag. N.S.	−79 12·4	s.	−85	−35	−81 12		
			Mag. S.	−79 43·4	s.	−85	−35	−81 43	−81 33	
			Direct.	−79 32·1	s. by E.	−83	−35	−81 30		
			Def. N.	−78 50·4	s. by E.	−83	−81	−81 34		
			Def. S.	−79 25·8	s. by E.	−83	−35	−81 24		
	−68 49	199 26	Direct.	−82 31·4	N.N.W.	+82	−35	−81 44		Fresh breeze, steady.
			Def. N.	−81 48·7	N.N.W.	+82	−81	−81 48		
5.	−68 52	198 24	Direct.	−81 51·5	s.w.	−52	−35	−83 19		
			Def. N.	−79 59·5	s.w.	−52	−81	−82 13		
			Def. S.	−80 58·7	s.w.	−52	−35	−82 26		
			Mag. N.	−80 48·0	s.w.	−52	−35	−82 15	−82 30	
			Mag. N.S.	−80 36·8	s.w.	−52	−35	−82 04		
			Mag. S.	−81 04·1	s.w.	−52	−35	−82 31		
			Direct.	−81 21·6	s.w. ½ w.	−44	−35	−82 41		
			Direct.	−81 20·0	s.w. by w.	−36	−35	−82 31		
6.	−69 55	192 17	Direct.	−81 09·2	s. by w.	−84	−35	−83 08		
			Def. N.	−80 15·1	s. by w.	−84	−81	−83 00		
			Def. S.	−81 04·2	s. by w.	−84	−35	−83 03		
			Mag. N.	−80 52·3	s. by w.	−84	−35	−82 51		
			Mag. N.S.	−80 39·1	s. by w.	−84	−35	−82 38	−83 00	Steering well, but table not steady.
			Mag. S.	−81 09·2	s. by w.	−84	−35	−83 08		
			Direct.	−81 12·8	s. by w.	−84	−35	−83 12		
			Direct.	−80 56·9	s.	−86	−35	−82 58		
			Def. N	−80 00·2	s.	−86	−81	−82 47		
			Direct.	−81 12·6	s. by w.	−84	−35	−83 12		
7.	−70 05	191 03	Direct.	−81 35·1	s.s.w.	−78	−35	−83 28		
			Def. N.	−80 38·2	s.s.w.	−78	−81	−83 17		
			Direct.	−81 56·4	s.w.	−52	−35	−83 23		
			Direct.	−81 35·3	s. by w. ¾ w.	−80	−35	−83 30		
			Def. S.	−81 20·0	s.s.w.	−78	−35	−83 13	−83 20	Strong breeze, ship steering wildly.
			Mag. N.	−81 24·7	s.s.w.	−78	−35	−83 18		
			Mag. N.S.	−81 15·6	s.s.w.	−78	−35	−83 09		
			Mag. S.	−81 23·9	s.s.w.	−78	−35	−83 17		
			Direct.	−81 29·6	s. by w. ½ w	−81	−35	−83 26		
8.	−70 08	186 39	Direct.	−81 56·9	s.w.	−52	−35	−83 24		
			Def. N.	−81 16·7	s.w.	−52	−81	−83 30		
			Direct.	−82 12·3	s.w. by w.	−36	−35	−83 23		
			Def. N.	−81 34·1	s.w. by w.	−36	−83	−83 31	−83 23	Table steady.

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
Feb. 8.	−70 08	186 39	Def. S.	−82 09·9	s.w. by w.	−36	−35	−83 21	−83 23	Table steady.
			Mag. N.	−82 10·1	s.w. by w.	−36	−35	−83 21		
			Mag. N.S.	−82 03·7	s.w. by w.	−36	−35	−83 15		
			Mag. S.	−82 10·3	s.w. by w.	−36	−35	−83 21		
			Direct.	−82 15·9	s.w. by w.	−36	−35	−83 27		
			Direct.	−81 19·7	s.	−87	−35	−83 22		
	−70 17	186 04	Direct.	−81 16·1	s.	−87	−35	−83 18		
			Def. N.	−80 37·6	s.	−87	−81	−83 26		
			Def. S.	−81 38·5	s.	−87	−35	−83 41		
			Mag. N.	−81 11·6	s.	−87	−35	−83 14		
			Mag. N.S.	−81 04·5	s.	−87	−35	−83 07		
			Mag. S.	−81 33·4	s.	−87	−35	−83 35		
			Direct.	−81 20·6	s.	−87	−35	−83 23		
9.	−70 32	185 38	Direct.	−83 51·8	w. by n.	+32	−35	−83 55		
			Def. N.	−83 09·4	w. by n.	+32	−81	−83 58		
			Def. S.	−83 55·8	w. by n.	+32	−35	−83 59		
			Mag. N.S.	−83 36·2	w. by n.	+32	−35	−83 39		
			Direct.	−82 08·5	w. by n.	+32	−35	−82 12	−83 30	Head swell, unsteady.
			Def. N.	−81 14·8	w. by n.	+32	−81	−82 04		
			Direct.	−82 02·7	s.e. ½ s.	−59	−35	−83 37		
			Def. S.	−82 01·0	s.e. ½ s.	−59	−35	−83 35		
			Mag. N.S.	−82 03·5	s.e. ½ s.	−59	−35	−83 38		
			Direct.	−82 12·6	s.e. by s.	−66	−35	−83 54		
10.	−69 56	184 43	Direct.	−83 33·0	w. by s.	− 1	−35	−84 09		
			Def. N.	−82 37·3	w. by s.	− 1	−81	−83 59		
			Def. S.	−83 31·5	w. by s.	− 1	−35	−84 07		
			Mag. N.	−83 25·9	w. by s.	− 1	−35	−84 02	−84 03	Heavy swell, unsteady.
			Mag. N.S.	−83 11·0	w. by s.	− 1	−35	−83 47		
			Mag. S.	−83 33·1	w. by s.	− 1	−35	−84 09		
			Direct.	−83 34·2	w. by s.	− 1	−35	−84 10		
			Direct.	−83 46·2	w.	+17	−35	−84 04		
11.	−69 51	183 02	Direct.	−83 21·8	w.s.w.	−18	−35	−84 15		
			Def. N.	−82 21·1	w.s.w.	−18	−81	−84 00		
			Def. S.	−83 04·0	w.s.w.	−18	−35	−83 57		
			Mag. N.	−83 25·7	w.s.w.	−18	−35	−84 19	−84 09	Strong wind, westerly swell, ship unsteady.
			Mag. N.S.	−82 58·0	w.s.w.	−18	−35	−83 51		
			Mag. S.	−83 20·5	w.s.w.	−18	−35	−84 14		
	−70 03	181 44	Direct.	−82 45·0	s.w. by s.	−66	−35	−84 26		
12.	−71 03	180 56	Direct.	−82 46·6	s.e. by s.	−66	−35	−84 28		
			Def. N.	−81 48·5	s.e. by s.	−66	−81	−84 16		
			Def. S.	−82 39·3	s.e. by s.	−66	−35	−84 20		Cross sea, table very unsteady.
			Mag. N.	−82 24·9	s.e. by s.	−66	−35	−84 06		
			Mag. N.S.	−82 21·1	s.e. by s.	−66	−35	−84 02	−84 20	
			Mag. S.	−82 34·9	s.e. by s.	−66	−35	−84 16		
			Direct.	−82 45·2	s.e. by s.	−66	−35	−84 26		Table very unsteady, a cross sea.
	−71 02	180 58	Direct.	−83 08·2	s.e. by s.	−66	−35	−84 49		
13.	−72 07	181 50	Direct.	−83 16·8	s.e. by s.	−66	−35	−84 58		
			Def. N.	−82 21·1	s.e. by s.	−66	−81	−84 48		
			Def. S.	−83 18·6	s.e. by s.	−66	−35	−85 00		
			Mag. N.	−83 06·9	s.e. by s.	−66	−35	−84 48		
			Mag. N.S.	−82 55·3	s.e. by s.	−66	−35	−84 36	−84 59	A swell from N.W., ship unsteady, steering badly.
			Mag. S.	−83 17·7	s.e. by s.	−66	−35	−84 59		
			Direct.	−83 20·2	s.e. by s.	−66	−35	−85 01		
			Direct.	−83 37·9	s.e. by s.	−66	−35	−85 19		
			Direct.	−83 40·5	s.e. by s.	−66	−35	−85 22		

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Feb. 14.	−72 55	181 33	Direct.	−83 58·2	S.E. by E.	−36	−35	−85 09		
			Def. N.	−83 21·7	S.E. by E.	−36	−81	−85 19		
			Def. S.	−84 07·0	S.E. by E.	−36	−35	−85 18		A swell from the W.N.W., unsteady.
			Mag. N.	−84 01·7	S.E. by E.	−36	−35	−85 13		
			Mag. N.S.	−83 29·5	S.E. by E.	−36	−35	−84 40	−85 22	
			Mag. S.	−83 58·4	S.E. by E.	−36	−35	−85 09		
			Direct.	−84 00·6	S.E. by E.	−36	−35	−85 12		
	−73 23	181 11	Direct.	−84 16·8	S.E.	−52	−35	−85 44		Strong breeze, unsteady.
15.	−74 20	177 55	Direct.	−84 51·4	S.E. by S.	−66	−35	−86 32		Heavy sea, very unsteady.
16.	−74 51	174 02	Direct.	−85 13·4	S.S.E.	−79	−35	−87 07		
			Def. N.	−84 17·5	S.S.E.	−79	−81	−86 58		
			Def. S.	−85 10·6	S.S.E.	−79	−35	−87 05		
			Mag. N.	−85 08·8	S.S.E.	−79	−35	−87 03		Table steady.
			Mag. N.S.	−84 53·3	S.S.E.	−79	−35	−86 47		
			Mag. S.	−85 12·0	S.S.E.	−79	−35	−87 06		
			Direct.	−85 15·6	S.S.E.	−79	−35	−87 10	−87 05	
	−75 05	173 10	Direct.	−85 49·1	S.E.	−52	−35	−87 16		
	−75 09	173 16	Direct.	−86 56·1	E. ½ S.	+ 7	−35	−87 24		
			Direct.	−86 33·0	E. by S.	− 2	−35	−87 10		
			Def. N.	−85 35·9	E. by S.	− 2	−81	−86 59		N.W. swell, slight motion.
			Def. S.	−86 39·6	E. by S.	− 2	−35	−87 17		
			Mag. N.S.	−86 13·2	E. by S.	− 2	−35	−86 50		
17.	−75 57	175 08	Direct.	−87 15·8	E.N.E.	+46	−35	−87 05		
	−76 06	174 57	Direct.	−87 12·6	E. by N. ½ N.	+39	−35	−87 09		
			Def. N.	−86 31·1	E. by N. ½ N.	+39	−81	−87 13		
			Def. S.	−87 05·2	E. by N. ½ N.	+39	−35	−87 01		
			Mag. N.	−86 50·8	E. by N. ½ N.	+39	−35	−86 47	−87 03	Very unsteady, steering badly.
			Mag. N.S.	−86 39·4	E. by N. ½ N.	+39	−35	−86 35		
			Mag. S.	−87 33·9	E. by N. ½ N.	+39	−35	−87 30		
			Direct.	−87 08·0	E. by N. ½ N.	+39	−35	−87 04		
18.	−77 02	181 37	Direct.	−87 06·3	E.N.E.	+46	−35	−86 55		
			Def. N.	−86 16·8	E.N.E.	+46	−81	−86 52		
			Def. S.	−87 21·3	E.N.E.	+46	−35	−87 10		
			Mag. N.	−87 14·9	E.N.E.	+46	−35	−87 04		
			Mag. N.S.	−86 45·6	E.N.E.	+46	−35	−86 35	−86 56	
			Mag. S.	−87 15·2	E.N.E.	+46	−35	−87 04		
			Direct.	−87 37·4	N.E. ½ E.	+64	−35	−87 08		
	−77 09	181 22	Direct.	−86 56·5	N.E. by E. ½ E.	+52	−35	−86 39		
19.	−76 48	184 46	Direct.	−87 27·6	N. by E.	+88	−35	−86 35		
			Def. N.	−86 54·2	N. by E.	+88	−81	−86 47		
			Def. S.	−87 45·2	N. by E.	+88	−35	−86 52		
			Mag. N.	−87 16·6	N. by E.	+88	−35	−86 24	−86 30	Cross sea, table unsteady.
			Mag. N.S.	−87 15·1	N. by E.	+88	−35	−86 22		
			Mag. S.	−86 53·6	N. by E.	+88	−35	−86 01		
			Direct.	−87 29·1	N. by E.	+88	−35	−86 36		
	−76 50	186 21	Direct.	−87 01·3	N.E. ½ N.	+72	−35	−86 24		
20.	−76 20	190 26	Direct.	−86 44·6	N.E.	+69	−35	−86 11		
			Def. N.	−86 04·7	N.E.	+69	−81	−86 17		
			Def. S.	−86 42·3	N.E.	+69	−35	−86 08		
			Mag. N.	−86 26·7	N.E.	+69	−35	−85 53		
			Mag. N.S.	−86 23·0	N.E.	+69	−35	−85 49	−85 59	
			Mag. S.	−86 48·5	N.E.	+69	−35	−86 15		
			Direct.	−86 39·1	N.E.	+69	−35	−86 05		
	−76 14	192 29	Direct.	−85 56·9	N.E. by E.	+59	−35	−85 33		Strong gale, heavy sea, a great deal of motion.
21.	−75 45	195 02	Direct.	−84 13·7	S.W.	−52	−35	−85 41		

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.	Remarks.
				° ′				° ′	
Feb. 22.	−76 24	184 54	Direct.	−83 41·5	S.E. by S.	−66	−35	−85 23	
			Def. N.	−82 56·0	S.E. by S.	−66	−81	−85 23	
			Def. S.	−83 37·0	S.E. by S.	−66	−35	−85 18	
			Mag. N.	−83 19·8	S.E. by S.	−66	−35	−85 01	A head sea, ship unsteady.
			Mag. N.S.	−82 59·8	S.E. by S.	−66	−35	−84 41	
			Mag. S.	−83 29·9	S.E. by S.	−66	−35	−85 11	
			Direct.	−83 45·2	S.E. by S.	−66	−35	−85 26	
	−76 46	193 48	Direct.	−84 19·4	E.S.E.	−18	−35	−85 12	−85 12
	−77 13	193 52	Direct.	−84 37·4	E. by S.	− 1	−35	−85 13	
			Def. N.	−83 51·4	E. by S.	− 1	−81	−85 13	
			Def. S.	−84 50·8	E. by S.	− 1	−35	−85 27	
			Mag. N.	−84 31·6	E. by S.	− 1	−35	−85 08	Light swell, gentle motion.
			Mag. N.S.	−84 17·0	E. by S.	− 1	−35	−84 53	
			Mag. S.	−84 27·8	E. by S.	− 1	−35	−85 04	
			Direct.	−85 02·7	E.	+17	−35	−85 21	
23.	−77 48	197 23	Direct.	−84 14·6	S.W.byW.½W.	−27	−35	−85 17	
	−77 47	197 25	Direct.	−85 13·0	N.E. by E.	+59	−35	−84 49	
			Def. N.	−84 34·3	N.E. by E.	+59	−81	−84 56	
			Def. S.	−85 21·1	N.E. by E.	+59	−35	−84 57	
			Direct.	−85 05·7	E.N.E.	+46	−35	−84 55	−84 49 Table very steady.
			Mag. N.	−84 21·4	E.N.E.	+46	−35	−84 10	
			Mag. N.S.	−84 41·7	E.N.E.	+46	−35	−84 31	
			Mag. S	−85 00·2	E.N.E.	+46	−35	−84 49	
			Direct.	−85 05·5	E.N.E.	+46	−35	−84 55	
24.	−77 14	199 29	Direct.	−84 00·0	S.W. by S.	−66	−35	−85 41	
			Def. N.	−83 17·5	S.W. by S.	−66	−81	−85 45	
			Def. S.	−83 57·7	S.W. by S.	−66	−35	−85 39	
			Mag. N.	−83 42·9	S.W. by S.	−66	−35	−85 24	
			Mag. N.S.	−83 32·3	S.W. by S.	−66	−35	−85 13	−85 35 Swell from N.E., steady.
			Mag. S.	−84 11·7	S.W. by S.	−66	−35	−85 53	
			Direct.	−85 13·3	W.	+17	−35	−85 31	
	−77 00	198 50	Direct.	−84 25·8	S.W. by W.	−36	−35	−85 37	
25.	−75 20	194 36	Direct.	−85 30·9	W.	+17	−35	−85 49	
			Def. N.	−84 33·1	W.	+17	−81	−85 37	
			Def. S.	−85 28·4	W.	+17	−35	−85 46	
			Mag. N.	−85 15·5	W.	+17	−35	−85 34	
			Mag. N.S.	−84 59·3	W.	+17	−35	−85 17	−85 46 Swell from the E.N.E., steady.
			Mag. S.	−85 22·7	W.	+17	−35	−85 41	
			Direct.	−85 38·6	W.	+17	−35	−85 57	
			Direct.	−84 34·6	S.W. by S.	−66	−35	−86 16	
			Direct.	−86 03·9	W.N.W.	+46	−35	−85 53	
26.	−73 10	189 21	Direct.	−85 37·4	N.W. by W.	+60	−35	−85 12	
			Def. N.	−84 44·0	N.W. by W.	+60	−81	−85 05	
			Def. S.	−85 36·9	N.W. by W.	+60	−35	−85 12	
			Mag. N.	−85 19·6	N.W. by W.	+60	−35	−84 55	−85 08 Strong breeze, motion great.
			Mag. N.S.	−85 37·8	N.W. by W.	+60	−35	−85 13	
			Mag. S.	−85 30·6	N.W. by W.	+60	−35	−85 06	
			Direct.	−85 35·6	N.W. by W.	+60	−35	−85 11	
27.	−72 03	187 40	Direct.	−83 30·8	S.W.	−52	−35	−84 58	
			Def. N.	−82 37·6	S.W.	−52	−81	−84 51	
			Def. S.	−83 36·5	S.W.	−52	−35	−85 04	
			Mag. N.	−83 07·6	S.W.	−52	−35	−84 35	
			Direct.	−84 56·8	W. by N. ½ N.	+39	−35	−84 53	−84 56 Swell from the eastward, motion slight.
			Mag. N.S.	−84 25·5	W. by N. ½ N.	+39	−35	−84 22	
			Mag. S.	−83 43·4	S.W.	−52	−35	−85 10	
			Direct.	−83 52·3	W.S.W.	−18	−35	−84 45	
	−71 43	187 15	Direct.	−84 56·8	W.S.W.	−18	−35	−85 50	Table steady.

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.	True Inclination.	Remarks.
									° ′	
Feb. 28.	−71 20	184 30	Direct.	−84 01·9	w. by s.	− 1	−35	−84 38		
			Def. N.	−82 59·6	w. by s.	− 1	−81	−84 22		
			Def. S.	−83 56·9	w. by s.	− 1	−35	−84 33		
			Mag. N.	−83 37·9	w. by s.	− 1	−35	−84 14		
			Mag. N.S.	−83 23·9	w. by s.	− 1	−35	−84 00		
			Mag. S.	−84 00·7	w. by s.	− 1	−35	−84 37	−84 37	Table steady.
			Direct.	−83 35·3	s.w. by w.	− 36	−35	−84 46		
	−70 55	183 56	Direct.	−84 32·0	w. ½ s.	+ 8	−35	−84 59		
			Direct.	−84 36·8	w.	+ 17	−35	−84 55		
	−70 49	183 46	Direct.	−85 31·6	N.W. ½ W.	+ 64	−35	−85 03		
Mar. 1.	−69 54	179 55	Direct.	−85 00·0	W.N.W.	+ 54	−35	−84 41		
			Def. N.	−84 06·3	W.N.W.	+ 54	−81	−84 33		
			Def. S.	−84 54·4	W.N.W.	+ 54	−35	−84 35		
			Mag. N.	−84 44·4	W.N.W.	+ 54	−35	−84 25		
			Mag. N.S.	−84 35·4	W.N.W.	+ 54	−35	−84 16	−84 30	Swell from the eastward, table steady.
			Mag. S.	−84 44·7	W.N.W.	+ 54	−35	−84 26		
			Direct.	−84 54·2	W.N.W.	+ 54	−35	−84 35		
			Direct.	−84 28·0	W. by N.	+ 37	−35	−84 26		
2.	−68 09	183 10	Direct.	−83 45·8	N.N.E.	+ 99	−35	−82 42		
			Def. N.	−82 29·8	N.N.E.	+ 99	−81	−82 12		
			Def. S.	−83 33·2	N.N.E.	+ 99	−35	−82 29		
			Mag. N.	−83 31·2	N.N.E.	+ 99	−35	−82 27	−82 26	Table steady.
			Mag. N.S.	−83 17·5	N.N.E.	+ 99	−35	−82 14		
			Mag. S.	−83 26·9	N.N.E.	+ 99	−35	−82 23		
			Direct.	−83 40·9	N.N.E.	+ 99	−35	−82 37		
3.	−67 35	185 18	Direct.	−82 27·4	N.E. by E.	+ 71	−35	−81 51		
			Direct.	−82 53·4	N.E.	+ 83	−35	−82 05		
			Direct.	−82 21·8	N.E. by E.	+ 71	−35	−81 46		
			Def. N.	−81 31·3	N.E. by E.	+ 71	−81	−81 41		
			Def. S.	−82 16·9	N.E. by E.	+ 71	−35	−81 41		Cross sea, unsteady.
			Mag. N.	−82 04·0	N.E. by E.	+ 71	−35	−81 28		
			Mag. N.S.	−81 58·7	N.E. by E.	+ 71	−35	−81 23		
			Mag. S.	−82 02·7	N.E. by E.	+ 71	−35	−81 27	−81 33	
			Direct.	−82 28·2	N.E. ½ E.	+ 76	−35	−81 52		
	−67 27	185 32	Direct.	−82 12·6	W.	+ 18	−35	−82 30		
4.	−67 40	187 40	Direct.	−82 18·4	N. by W.	+103	−35	−81 10		
			Def. N.	−81 14·9	N. by W.	+103	−81	−80 53		Strong gale, heavy sea, very unsteady.
			Def. S.	−82 28·2	N. by W.	+103	−35	−81 20		
			Mag. N.	−82 07·0	N. by W.	+103	−81	−80 59		
			Mag. S.	−82 22·0	N. by W.	+103	−35	−81 14		
5.	−67 09	188 02	Direct.	−82 13·3	N.	+104	−35	−81 04		
			Def. N.	−81 40·1	N.	+104	−81	−81 17		
			Def. S.	−81 45·6	N.	+104	−35	−80 37		
			Mag. N.	−82 19·7	N.	+104	−35	−81 11	−81 03	Heavy sea, very unsteady.
			Mag. N.S.	−82 01·2	N.	+104	−35	−80 52		
			Mag. S.	−82 16·6	N.	+104	−35	−81 08		
			Direct.	−82 20·0	N.	+104	−35	−81 11		
6.	−65 28	191 24	Direct.	−81 09·3	N. by E.	+102	−35	−80 02		
			Def. N.	−80 06·6	N. by E.	+102	−81	−79 46		
			Def. S.	−80 50·1	N. by E.	+102	−35	−79 43		
			Mag. N.	−80 47·0	N. by E.	+102	−35	−79 40		
			Mag. N.S.	−80 34·9	N. by E.	+102	−35	−79 28		
			Mag. S.	−81 00·6	N. by E.	+102	−35	−79 54	−79 42	South-westerly swell, unsteady.
			Direct.	−81 03·5	N. by E.	+102	−35	−79 57		
	−65 04	192 00	Direct.	−80 44·2	N. by E.	+102	−35	−79 37		
	−64 49	192 21	Direct.	−80 28·9	N. by E. ½ E.	+ 99	−35	−79 25		
			Direct.	−80 30·4	N. by E. ½ E.	+ 99	−35	−79 26		

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.	True Inclination.	Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Mar. 7.	−63 30	194 15	Direct.	−79 46·4	N. by E.	+100	−35	−78 41		
			Def. N.	−78 34·4	N. by E.	+100	−81	−78 15		
			Def. S.	−79 29·2	N. by E.	+100	−35	−78 24		
			Mag. N.	−79 26·0	N. by E.	+100	−35	−78 21	−78 30	Steady.
			Mag. N.S.	−79 24·0	N. by E.	+100	−35	−78 19		
			Mag. S.	−79 50·3	N. by E.	+100	−35	−78 45		
			Direct.	−79 49·3	N. by E.	+100	−35	−78 44		
8.	−62 17	195 55	Direct.	−78 44·7	N. by E.	+100	−35	−77 40		
			Def. N.	−77 54·4	N. by E.	+100	−81	−77 35		
			Def. S.	−78 25·8	N. by E.	+100	−35	−77 21		
			Mag. N.	−78 27·8	N. by E.	+100	−35	−77 23	−77 30	Steady.
			Mag. N.S.	−78 20·3	N. by E.	+100	−35	−77 15		
			Mag. S.	−78 42·8	N. by E.	+100	−35	−77 38		
			Direct.	−78 40·3	N. by E.	+100	−35	−77 35		
9.	−61 06	198 08	Direct.	−77 41·6	N.E. ½ N.	+ 85	−35	−76 52		
			Def. N.	−76 24·7	N.E. ½ N.	+ 85	−81	−76 22		
			Def. S.	−77 25·9	N.E. ½ N.	+ 85	−35	−76 36		
			Mag. N.	−77 16·4	N.E. by N.	+ 88	−35	−76 23	−76 32	Steady.
			Direct.	−77 38·4	N.E. by N.	+ 88	−35	−76 45		
			Mag. N.S.	−77 11·9	N.E. by N.	+ 88	−35	−76 19		
			Mag. S.	−77 16·9	N.E. by N.	+ 88	−35	−76 24		
			Direct.	−77 28·6	N.E. by N.	+ 88	−35	−76 36		
			Direct.	−77 16·7	N.E.	+ 81	−35	−76 31		
10.	−60 57	199 03	Direct.	−75 32·7	E.N.E.	+ 53	−35	−75 15		
			Def. N.	−74 41·0	E.N.E.	+ 53	−81	−75 19		
			Def. S.	−75 33·6	E.N.E	+ 53	−35	−75 16		
			Mag. N.	−75 14·2	E.N.E.	+ 53	−35	−74 56	−75 08	Table unsteady.
			Mag. N.S.	−75 08·5	E.N.E.	+ 53	−35	−74 51		
			Mag. S.	−75 27·1	E.N.E.	+ 53	−35	−75 09		
			Direct.	−75 30·9	E.N.E.	+ 53	−35	−75 13		
11.	−60 15	208 06	Direct.	−74 20·6	E. by N.	+ 37	−35	−74 19		
			Def. N.	−73 57·2	E. by N.	+ 37	−81	−74 41		
			Def. S.	−74 16·0	E. by N.	+ 37	−35	−74 14		
			Mag. N.	−74 32·4	E. by N.	+ 37	−35	−74 30	−74 21	Strong gale, heavy sea, ship unsteady.
			Mag. N.S.	−74 16·0	E. by N.	+ 37	−35	−74 14		
			Mag. S.	−74 20·9	E. by N.	+ 37	−35	−74 19		
			Direct.	−74 28·5	E. by N.	+ 37	−35	−74 27		
12.	−60 16	211 45	Direct.	−74 07·4	E. by N.	+ 37	−35	−74 05		
			Def. N.	−73 31·1	E. by N.	+ 37	−81	−74 15		
			Def. S.	−74 20·5	E. by N.	+ 37	−35	−74 18		
			Mag. N.	−74 08·9	E. by N.	+ 37	−35	−74 07		
			Mag. N.S.	−74 28·0	E. by N.	+ 37	−35	−74 26	−74 14	Heavy swell, ship unsteady.
			Mag. S.	−74 33·4	E. by N.	+ 37	−35	−74 31		
			Direct.	−74 11·5	E. by N.	+ 37	−35	−74 09		
	−60 18	212 39	Direct.	−73 59·8	E. by N.	+ 37	−35	−73 58		
13.	−59 53	216 28	Direct.	−74 15·6	N.E. ½ E.	+ 74	−35	−73 37		
			Def. N.	−73 29·3	N.E. ½ E.	+ 74	−81	−73 36		
			Def. S.	−74 15·9	N.E. ½ E.	+ 74	−35	−73 37		
			Mag. N.	−74 09·7	N.E. ½ E.	+ 74	−35	−73 31	−73 36	Heavy swell, steering very wildly.
			Mag. N.S.	−74 15·3	N.E. ½ E.	+ 74	−35	−73 36		
			Mag. S.	−74 16·5	N.E. ½ E.	+ 74	−35	−73 37		
			Direct.	−74 18·2	N.E. ½ E.	+ 74	−35	−73 39		
14.	−59 22	218 14	Direct.	−75 02·4	N.E. by E.	+ 69	−35	−74 28		
			Def. N.	−74 26·8	N.E. by E.	+ 69	−81	−74 39		
			Def. S.	−75 01·0	N.E. by E.	+ 69	−35	−74 27		
			Mag. N.	−74 50·0	N.E. by E.	+ 69	−35	−74 16	−73 48	Heavy swell from W.S.W., very unsteady, steering very badly.

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
Mar. 14.	−59° 22′	218° 14′	Mag. N.S.	−74° 58·0	N.E. by E.	+69	−35	−74° 24′	−73° 48′	Heavy swell from W.S.W., very unsteady, steering very badly.
			Mag. S.	−75 01·0	N.E. by E.	+69	−35	−74 27		
			Direct.	−75 09·6	N.E. by E.	+69	−35	−74 36		
			Direct.	−75 07·1	N.E. by E.	+69	−35	−74 33		
			Direct.	−75 13·7	N.E. by E.	+69	−35	−74 40		
15.	−58 49	221 25	Direct.	−73 06·6	E.N.E.	+53	−35	−72 49		
			Def. N.	−72 15·7	E.N.E.	+53	−81	−72 44		
			Def. S.	−73 21·2	E.N.E.	+53	−35	−73 03		
			Mag. N.	−73 08·4	E.N.E.	+53	−35	−72 50		
			Mag. N.S.	−73 13·1	E.N.E.	+53	−35	−72 55		
			Mag. S.	−73 07·7	E.N.E.	+53	−35	−72 50		
			Direct.	−73 10·8	E.N.E.	+53	−35	−72 53		
	−58 48	222 22	Direct.	−74 05·2	E. by N.	+37	−35	−74 03		
16.	−58 59	227 30	Direct.	−73 24·8	E.	+21	−35	−73 39		
	−59 01	227 43	Direct.	−73 21·9	E.	+21	−35	−73 36		
			Def. N.	−72 33·3	E.	+21	−81	−73 30		
			Def. S.	−73 14·1	E.	+21	−35	−73 28		
			Mag. N.	−73 00·4	E.	+21	−35	−73 14	−73 25	Heavy sea from W.S.W., very unsteady, steering very badly.
			Mag. N.S.	−73 09·6	E.	+21	−35	−73 24		
			Mag. S.	−73 07·0	E.	+21	−35	−73 21		
			Direct.	−73 26·6	E.	+21	−35	−73 41		
17.	−59 32	231 46	Direct.	−72 41·3	E.	+21	−35	−72 55		
18.	−60 05	235 56	Direct.	−72 19·5	E. by S.	+ 2	−35	−72 53		
			Def. N.	−71 10·6	E. by S.	+ 2	−81	−72 30		
			Def. S.	−72 24·0	E. by S.	+ 2	−35	−72 57		Heavy sea from W.S.W., very unsteady, steering very badly.
			Mag. N.	−72 29·7	E. by S.	+ 2	−35	−73 03		
			Mag. N.S.	−72 04·7	E. by S.	+ 2	−35	−72 38		
			Mag. S.	−72 52·0	E. by S.	+ 2	−35	−73 25	−73 01	
			Direct.	−73 01·1	E. by N.	+37	−35	−72 59		
	−60 17	236 38	Direct.	−72 59·1	E.	+21	−35	−73 13		Table more steady, and steering very well.
			Def. N.	−71 56·0	E.	+21	−81	−72 56		
			Def. S.	−73 02·3	E.	+21	−35	−73 16		
			Mag. N.	−73 09·9	E.	+21	−35	−73 24		
			Mag. N.S.	−72 59·8	E.	+21	−35	−73 14		
			Mag. S.	−72 54·8	E.	+21	−35	−73 13		
			Direct.	−73 01·8	E.	+21	−35	−73 16		
	−60 24	237 29	Direct.	−73 08·6	E. by N.	+37	−35	−73 06		
			Def. N.	−72 17·2	E. by N.	+37	−81	−73 01	−73 08	Table more steady, and steering very well.
			Def. S.	−73 09·0	E. by N.	+37	−35	−73 07		
			Mag. N.	−73 09·7	E. by N.	+37	−35	−73 08		
			Mag. N.S.	−73 06·2	E. by N.	+37	−35	−73 04		
			Mag. S.	−73 07·2	E. by N.	+37	−35	−73 05		
			Direct.	−73 07·1	E. by N.	+37	−35	−73 05		
19.	−60 00	240 57	Direct.	−71 59·1	E.N.E.	+53	−35	−71 41		Strong gale, heavy sea, steering badly.
20.	−59 18	245 29	Direct.	−72 17·9	N.E.	+78	−35	−71 35		
21.	−59 05	247 17	Direct.	−71 23·1	E. by N.	+37	−35	−71 21		
			Def. N.	−70 26·9	E. by N.	+37	−81	−71 11		
			Def. S.	−71 26·8	E. by N.	+37	−35	−71 25	−71 24	
			Mag. N.	−71 32·0	E. by N.	+37	−35	−71 30		Cross sea, slight motion.
			Mag. N.S.	−71 20·1	E. by N.	+37	−35	−71 18		
			Mag. S.	−71 22·7	E. by N.	+37	−35	−71 21		
			Direct.	−71 20·9	E. by N.	+37	−35	−71 19		
	−59 00	248 49	Direct.	−71 53·4	N.E. ½ E.	+73	−35	−71 15		Head sea, table unsteady.

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Mar. 22.	−58 26	251 42	Direct.	−71 06·1	E. by N.	+37	−35	−71 04		
			Def. N.	−70 01·3	E. by N.	+37	−81	−70 45		
			Def. S.	−70 45·2	E. by N.	+37	−35	−70 43		
			Mag. N.	−71 03·3	E. by N.	+37	−35	−71 01	−70 55	Cross sea, unsteady.
			Mag. N.S.	−70 44·0	E. by N.	+37	−35	−70 42		
			Mag. S.	−71 07·8	E. by N.	+37	−35	−71 06		
			Direct.	−71 02·9	E. by N.	+37	−35	−71 01		
23.	−58 33	254 45	Direct.	−70 24·7	E. ½ N.	+30	−35	−70 30		
			Def. N.	−69 05·4	E. ½ N.	+30	−81	−69 56		
			Def. S.	−69 57·5	E. ½ N.	+30	−35	−70 03		
			Mag. N.	−70 02·7	E. ½ N.	+30	−35	−70 08	−70 16	Slight motion.
			Mag. N.S.	−70 21·7	E. ½ N.	+30	−35	−70 27		
			Mag. S.	−70 10·1	E. ½ N.	+30	−35	−70 15		
			Direct.	−70 31·2	E. ½ N.	+30	−35	−70 36		
24.	−58 40	257 32	Direct.	−70 01·8	E. by N.	+37	−35	−70 00		
			Def. N.	−69 09·1	E. by N.	+37	−81	−69 53		
			Def. S.	−69 43·7	E. by N.	+37	−35	−69 42		
			Mag. N.	−69 47·0	E. by N.	+37	−35	−69 45		Slight motion.
			Mag. N.S.	−69 37·4	E. by N.	+37	−35	−69 35		
			Mag. S.	−70 03·0	E. by N.	+37	−35	−70 01	−69 50	
			Direct.	−70 01·8	E. by N.	+37	−35	−70 00		
			Direct.	−69 52·9	E.	+22	−35	−70 06		
	−58 49	258 13	Direct.	−69 51·1	E. by N.	+37	−35	−69 49		Table steady, very slight motion.
	−58 53	258 55	Direct.	−69 24·2	E. by N.	+37	−35	−69 32		
25.	−58 54	263 35	Direct.	−69 17·9	E.N.E.	+53	−35	−69 00		
26.	−58 59	267 50	Direct.	−68 19·8	E. by N. ½ N.	+44	−35	−68 11		
			Def. N.	−67 03·0	E. by N. ½ N.	+44	−81	−67 40		
			Def. S.	−68 05·4	E. by N. ½ N.	+44	−35	−67 56	−68 00	Heavy sea, steering badly, a little motion.
			Mag. N.	−67 44·2	E. by N. ½ N.	+44	−35	−67 35		
			Mag. N.S.	−67 52·6	E. by N. ½ N.	+44	−35	−67 44		
			Mag. S.	−67 52·5	E. by N. ½ N.	+44	−35	−67 44		
			Direct.	−68 15·6	E. by N. ½ N.	+44	−35	−68 07		
27.	−59 01	272 06	Direct.	−67 19·3	E.N.E.	+52	−35	−67 02		
			Def. N.	−66 46·0	E.N.E.	+52	−81	−67 15		
			Def. S.	−67 09·6	E.N.E.	+52	−35	−66 53		
			Mag. N.	−66 53·0	E.N.E.	+52	−35	−66 36	−66 53	A swell from the W.S.W., ship unsteady.
			Mag. N.S.	−66 59·0	E.N.E.	+52	−35	−66 42		
			Mag. S.	−67 05·8	E.N.E.	+52	−35	−66 49		
			Direct.	−67 17·8	E.N.E.	+52	−35	−67 01		
			Direct.	−67 04·7	E.N.E.	+52	−35	−66 48		
28.	−58 54	276 18	Direct.	−66 51·5	N.E. by E.	+64	−35	−66 23		
			Def. N.	−65 48·2	N.E. by E.	+64	−81	−66 05		
			Def. S.	−66 53·4	N.E. by E.	+64	−35	−66 24		
			Mag. N.	−66 15·2	N.E. by E.	+64	−35	−65 46	−66 10	Swell from the W.S.W., ship unsteady.
			Mag. N.S.	−66 18·7	N.E. by E.	+64	−35	−65 50		
			Mag. S.	−66 51·6	N.E. by E.	+64	−35	−66 23		
			Direct.	−66 51·8	N.E. by E.	+64	−35	−66 23		
29.	−58 25	279 44	Direct.	−65 05·3	N.E. by E.	+62	−35	−64 38		
			Direct.	−65 27·9	N.E. by E.	+62	−35	−65 01		
			Def. N.	−64 13·0	N.E. by E.	+62	−81	−64 32		
			Def. S.	−65 20·9	N.E. by E.	+62	−35	−64 54		
			Mag. N.	−65 03·0	N.E. by E.	+62	−35	−64 36	−64 44	Swell from S.W., slight motion.
			Mag. N.S.	−65 01·6	N.E. by E.	+62	−35	−64 35		
			Mag. S.	−65 08·8	N.E. by E.	+62	−35	−64 42		
			Direct.	−65 22·6	N.E. by E.	+62	−35	−64 56		

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
	° ′	° ′		° ′		′	′	° ′	° ′	
Mar. 30.	−58 31	281 33	Direct.	−64 15·6	E.N.E.	+51	−35	−64 00		
			Direct.	−64 25·0	N.E. by E.	+62	−35	−63 58		
			Def. N.	−63 11·3	N.E. by E.	+62	−81	−63 30		
			Def. S.	−64 11·8	N.E. by E.	+62	−35	−63 45		
			Mag. N.	−64 05·6	N.E. by E.	+62	−35	−63 39	−63 48	Swell from S.W., slight motion.
			Mag. N.S.	−64 09·8	N.E. by E.	+62	−35	−63 43		
			Mag. S.	−64 27·0	N.E. by E.	+62	−35	−64 00		
			Direct.	−64 17·7	N.E. by E.	+62	−35	−63 51		
	−58 30	282 07	Direct.	−64 14·9	N.E. by E.	+62	−35	−63 48		
31.	−58 36	285 33	Direct.	−63 42·0	N.E.	+69	−35	−63 08		
			Def. N.	−62 50·6	N.E.	+69	−81	−63 03		
			Def. S.	−63 49·8	N.E.	+69	−35	−63 16		
			Mag. N.	−63 22·5	N.E.	+69	−35	−62 49	−63 00	Swell from S.W., slight motion.
			Mag. N.S.	−63 17·2	N.E.	+69	−35	−62 43		
			Mag. S.	−63 24·6	N.E.	+69	−35	−62 51		
			Direct.	−63 44·5	N.E.	+69	−35	−63 11		
April 1.	−57 21	289 36	Direct.	−62 26·9	N.E. by N.	+71	−35	−61 51		
			Def. N.	−61 16·8	N.E. by N.	+71	−81	−61 27		
			Def. S.	−62 04·7	N.E. by N.	+71	−35	−61 29		
			Mag. N.	−62 04·4	N.E. by N.	+71	−35	−61 28	−61 36	Ship unsteady, steering very wildly.
			Mag. N.S.	−62 12·7	N.E. by N.	+71	−35	−61 37		
			Mag. S.	−62 12·4	N.E. by N.	+71	−35	−61 36		
			Direct.	−62 17·0	N.E. by N.	+71	−35	−61 41		
2.	−57 26	291 32	Direct.	−58 55·8	S.E.	−33	−35	−60 04		
			Def. N.	−57 57·1	S.E.	−33	−81	−59 51		
			Def. S.	−58 43·2	S.E.	−33	−35	−59 51		
			Mag. N.	−58 49·5	S.E.	−33	−35	−59 58	−59 52	Heavy sea, ship unsteady.
			Mag. N.S.	−58 29·2	S.E.	−33	−35	−59 37		
			Mag. S.	−58 23·7	S.E.	−33	−35	−59 32		
			Direct.	−58 59·8	S.E.	−33	−35	−60 08		
	−57 25	292 02	Direct.	−58 22·4	S.S.E.	−62	−35	−59 59		
3.	−56 37	294 34	Direct.	−59 50·8	N.E.	+65	−35	−59 21		
			Def. N.	−58 33·4	N.E.	+65	−81	−58 49		
			Def. S.	−59 43·5	N.E.	+65	−35	−59 13		
			Mag. N.	−59 19·3	N.E.	+65	−35	−58 49	−59 02	Steering badly.
			Mag. N.S.	−59 26·3	N.E.	+65	−35	−58 56		
			Mag. S.	−59 21·8	N.E.	+65	−35	−58 52		
			Direct.	−59 45·5	N.E.	+65	−35	−59 16		
4.	−54 48	297 21	Direct.	−57 27·0	N. by E.	+66	−35	−56 56		
			Def. N.	−56 43·5	N. by E.	+66	−81	−56 58		
			Def. S.	−57 23·2	N. by E.	+66	−35	−56 52		
			Mag. N.	−57 10·4	N. by E.	+66	−35	−56 39	−56 48	Heavy sea, strong breeze, steering badly.
			Mag. N.S.	−57 13·4	N. by E.	+66	−35	−56 42		
			Mag. S.	−57 11·0	N. by E.	+66	−35	−56 40		
			Direct.	−57 19·0	N. by E.	+66	−35	−56 48		
5.	−52 40	299 52	Direct.	−54 40·0	N.N.E.	+58	−35	−54 17		
			Def. N.	−53 51·3	N.N.E.	+58	−81	−54 14		
			Def. S.	−54 43·4	N.N.E.	+58	−35	−54 20		
			Mag. N.	−54 31·9	N.N.E.	+58	−35	−54 09		
			Mag. N.S.	−54 22·3	N.N.E.	+58	−35	−53 59		
			Mag. S.	−54 15·0	N.N.E.	+58	−35	−53 42		
			Direct.	−54 32·3	N.N.E.	+58	−35	−54 09		
	−52 35	300 33	Direct.	−53 51·0	N.N.E.	+58	−35	−53 28		
	−52 28	300 42	Direct.	−53 08·3	N. by E.	+57	−35	−52 46		
			Def. N.	−52 26·4	N. by E.	+57	−81	−52 50		
			Def. S.	−53 07·9	N. by E.	+57	−35	−52 46	−53 25	Ship steady.

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.		Remarks.
April 5.	−52° 28′	300° 42′	Mag. N.	−52° 50·2	N. by E.	+57′	−35′	−52° 28′	−53° 25′	Ship steady.
			Mag. N.S.	−53 05·2	N. by E.	+57	−35	−52 43		
			Mag. S.	−53 00·8	N. by E.	+57	−35	−52 39		
			Direct.	−53 08·4	N. by E.	+57	−35	−52 46		
6.	−51 42	301 36	Direct.	−52 29·0	N.N.W. ½ W.	+54	−35	−52 10		
			Def. N.	−51 20·0	N.N.W. ½ W.	+54	−81	−51 47		
			Def. S.	−52 35·9	N.N.W. ½ W.	+54	−35	−52 17		
			Mag. N.	−52 16·3	N.N.W. ½ W.	+54	−35	−51 57	−52 04	Strong breeze, slight motion.
			Mag. N.S.	−52 20·7	N.N.W. ½ W.	+54	−35	−52 02		
			Mag. S.	−52 25·4	N.N.W. ½ W.	+54	−35	−52 06		
			Direct.	−52 24·5	N.N.W. ½ W.	+54	−35	−52 06		
9.	Port Louis, Falkland Islands.		Direct.	−51 32·8	W. ½ N.	+32	−35	−51 36		Single anchor.
			Def. N.	−50 51·4	W. ½ N.	+32	−81	−51 40		
			Def. S.	−52 09·8	W. ½ N.	+32	−35	−52 13		
11.	−51 32	301 53	Direct.	−51 36·7*			−35	−52 12		
			Def. N.	−50 33·0			−81	−51 54		
			Def. S.	−52 08·6			−35	−52 44		
			Mag. N.	−51 33·1			−35	−52 08		
			Mag. N.S.	−51 34·1			−35	−52 09		
			Mag. S.	−51 42·3			−35	−52 17		
July 25.			Direct.	−51 34·4†			−35	−52 09		
			Def. N.	−51 03·7			−81	−52 25		
			Def. S.	−51 58·7			−35	−52 34		
			Mag. N.	−51 32·8			−35	−52 08		
			Mag. N.S.	−51 33·8			−35	−52 09		
			Mag. S.	−51 43·3			−35	−52 18		
			Direct.	−51 31·6‡	Observed on shore.		−35	−52 07	−52 15	
			Def. N.	−51 00·8			−81	−52 22		
			Def. S.	−51 58·3			−35	−52 33		
			Mag. N.	−51 31·7			−35	−52 07		
			Mag. N.S.	−51 31·4			−35	−52 06		
			Mag. S.	−51 37·5			−35	−52 13		
			Direct.	−51 31·5			−35	−52 07		
			Direct.	−51 32·2§			−35	−52 07		
			Def. N.	−50 59·9			−81	−52 21		
			Def. S.	−51 58·3			−35	−52 33		
			Mag. N.	−51 31·9			−35	−52 07		
			Mag. N.S.	−51 32·3			−35	−52 07		
			Mag. S.	−51 44·3			−35	−52 19		

* Observed on shore; face west.

Direct. ..	−52° 49·6
Def. N. ..	−53 05·3
Def. S. ..	−52 48·3
Mag. N..	−53 00·8
Mag. N.S.	−53 09·7
Mag. S...	−53 12·1

† Observed on shore; face west.

Direct. ..	−52° 48·7
Def. N. ..	−53 42·2
Def. S. ..	−52 48·4
Mag. N..	−53 00·4
Mag. N.S.	−53 06·2
Mag. S...	−53 05·4

‡ Observed on shore; face west.

Direct. ..	−52° 39·5
Def. N. ..	−53 30·8
Def. S. ..	−52 57·9
Mag. N..	−53 05·7
Mag. N.S.	−53 01·8
Mag. S...	−53 12·7
Direct. ..	−52 38·6

§ Observed on shore; face west.

Direct. ..	−52° 41·5
Def. N. ..	−53 46·8
Def. S. ..	−52 56·4
Mag. N..	−53 04·0
Mag. N.S.	−53 02·4
Mag. S...	−53 07·6

Observations of Inclination. (Continued.)

1842.	Lat.	Long.	Method employed.	Observed Inclination. Face east.	Direction of ship's head.	Corrections. Ship's attraction.	Corrections. Index.	True Inclination.			Remarks.
	° ′	° ′		° ′ ″		′	′	° ′	° ′	° ′	
Aug. 15.	Berkeley Sound, Falkland Islands.		Direct.	−51 31·4	E. ½ S.	+22	−35	−51 44			
			Def. N.	−51 00·8	E. ½ S.	+22	−81	−52 00			
			Direct.	−51 45·5	E.	+28	−35	−51 52	−52 03		
			Def. N.	−51 21·2	E.	+28	−81	−52 14			
			Direct.	−51 29·1	E.S.E.	+ 4	−35	−52 00	−52 11		
			Def. N.	−51 06·2	E.S.E.	+ 4	−81	−52 23			
			Direct.	−50 44·9	S.E.	−22	−35	−51 58	−52 02		
			Def. N.	−50 23·4	S.E.	−22	−81	−52 06			
			Direct.	−50 28·8	S.S.E.	−45	−35	−51 49	−51 54		
			Def. N.	−49 52·3	S.S.E.	−45	−81	−51 58			
			Direct.	−50 11·7	S.	−52	−35	−51 39	−51 46		
			Def. N.	−49 38·9	S.	−52	−81	−51 52			
			Direct.	−50 43·1	S.S.W.	−45	−35	−52 03	−52 06		
			Def. N.	−50 03·0	S.S.W.	−45	−81	−52 09			
			Direct.	−50 48·4	S.W.	−22	−35	−51 45	−51 54		
			Def. N.	−50 21·3	S.W.	−22	−81	−52 04			
			Direct.	−51 11·2	W.S.W.	+ 4	−35	−51 42	−51 42		
			Def. N.	−50 25·0	W.S.W.	+ 4	−81	−51 42		−51 56	
			Direct.	−51 31·3	W.	+28	−35	−51 38	−51 45		
			Def. N.	−50 58·3	W.	+28	−81	−51 51			
			Direct.	−51 59·2	W.N.W.	+44	−35	−51 50	−51 55		
			Def. N.	−51 22·5	W.N.W.	+44	−81	−52 00			
			Direct.	−52 05·8	N.W.	+52	−35	−51 49	−51 53		
			Def. N.	−51 27·5	N.W.	+52	−81	−51 57			
			Direct.	−52 13·7	N.N.W.	+54	−35	−51 55	−51 48		
			Def. N.	−51 14·7	N.N.W.	+54	−81	−51 42			
			Direct.	−52 25·2	N.	+54	−35	−52 06	−51 52		
			Def. N.	−51 11·7	N.	+54	−81	−51 39			
			Direct.	−52 13·6	N.N.E.	+54	−35	−51 55	−51 58		
			Def. N.	−51 33·5	N.N.E.	+54	−81	−52 01			
			Direct.	−52 13·0	N.E.	+52	−35	−51 56	−51 56		
			Def. N.	−51 25·6	N.E.	+52	−81	−51 55			
			Direct.	−52 16·5	E.N.E.	+44	−35	−52 08	−52 07		
			Def. N.	−51 29·7	E.N.E.	+44	−81	−52 07			

Observations of the Intensity of the Magnetic Force made in Her Majesty's Ship Erebus, with Needle R. F. 5, between April 17, 1841, and August 23, 1842.

Observers Captain Sir James Clark Ross and Lieutenant Alexander Smith, R.N.

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Apr. 19.	Magnetic Observatory, Hobarton.		Def. S.	56° 28·6	64					Deflector employed R. F. 4.
			Def. N.	53 02·6	63					
	−42 52	147 24	wt. 6 grs.	42 55·7	61					
			wt. 5 grs.	34 23·5	60	Observed on shore.	1·820	.....	1·820	
			wt. 4 grs.	26 47·7	60					
			wt. 3 grs.	19 37·2	60					
20.			wt. 2 grs.	13 02·8*	60					
June 29.	At anchor in the river Derwent.		Def. S.	56 40·5	44	N.	1·809	+·024	1·832	
			Def. S.	56 44·8	44	N.N.E.	1·806	+·022	1·828	
			Def. S.	56 34·3	45	N.E.	1·815	+·018	1·833	
			Def. S.	56 26·1	45	E.N.E.	1·820	+·013	1·833	
			Def. S.	56 24·4	47	E.	1·821	+·004	1·825	
			Def. S.	56 17·8	47	E.S.E.	1·825	−·006	1·819	
			Def. S.	55 52·9	48	S.E.	1·846	−·016	1·830	
			Def. S.	55 46·5	50	S.S.E.	1·851	−·023	1·828	
			Def. S.	55 42·7	48	S	1·854	−·026	1·822	1·830
			Def. S.	55 48·7	48	S.S.W.	1·849	−·023	1·826	
			Def. S.	55 51·0	48	S.W.	1·847	−·016	1·831	
			Def. S.	56 10·3	48	W.S.W.	1·832	−·006	1·826	
			Def. S.	56 17·8	48	W.	1·825	+·004	1·829	
			Def. S.	56 15·3	48	W.N.W.	1·830	+·013	1·843	
			Def. S.	56 30·5	49	N.W.	1·817	+·018	1·835	
			Def. S.	56 29·0	48	N.N.W.	1·818	+·022	1·840	
			Def. S.	56 32·8	48	N.	1·815	+·024	1·839	
July 7.	Running out of Storm Bay.		Def. S.	55 37·6	49	S.E. ½ E.	1·858	−·014	1·842	1·842
			Def. N.	52 16·3	47	S.E. ½ E.	1·854			
8.	−43 00	148 28	Def. S.	56 20·7	52	N.N.E.	1·823	+·022	1·837	1·837 A heavy head swell.
			Def. N.	53 12·2	52	N.N.E.	1·807			
9.	−42 13	149 25	Def. S.	57 03·3	56	N.N.W.	1·790	+·022	1·809	1·809 A head swell.
			Def. N.	53 37·1	56	N.N.W.	1·785			
10.	−40 54	149 13	Def. S.	57 07·3	54	N. by W.	1·786	+·024	1·804	1·804
			Def. N.	53 51·6	60	N. by W.	1·773			
11.	−37 50	150 22	Def. N.	54 45·9	56	N. by W.	1·732	+·024	1·756	1·755
12.	−37 21	151 33	Def. S.	58 08·0	61	N.E.	1·742	+·022	1·764	
			Def. N.	54 59·1	61	N.E.	1·722			
13.	−36 01	151 48	Def. N.	55 08·5	58	N.W. by N.	1·715	+·027	1·742	1·720 Much motion.
14.	−33 52	151 21	Def. S.	59 41·8	60	N.	1·676	+·031	1·708	Running along the land.
			Def. N.	55 55·6	60	N.	1·679			
15.	Garden Island, Sydney.		Def. S.	59 09·0	53		1·698			
			Def. N.	55 35·9	52		1·694			
	−33 51	151 17	wt. 6 grs.	46 51·7	55		1·698			
			wt. 5 grs.	37 43·3	55		1·680			
			wt. 4 grs.	29 09·2	55	Observed on shore.	1·683	.....	1·685	1·685 The results with the face west are included in the mean.
			wt. 3 grs.	21 13·7	55		1·687			
			wt. 2 grs.	13 57·4	56		1·703			
			Def. S.	59 11·4†	52		1·696			
			Def. N.	55 38·1	52		1·692			

* Observed on shore; face west.

wt. 6 grs.	43° 07·5	Ther. 58°
wt. 5 grs.	34 51·5	Ther. 58
wt. 4 grs.	27 02·7	Ther. 58
wt. 3 grs.	19 55·5	Ther. 60
wt. 2 grs.	13 14·5	Ther. 60

† Observed on shore; face west.

			Intensity.
wt. 6 grs.	47° 32·4	Ther. 63°	1·688
wt. 5 grs.	37 38·9	Ther. 63	1·704
wt. 4 grs.	29 32·1	Ther. 64	1·680
wt. 3 grs.	21 51·4	Ther. 63	1·667
wt. 2 grs.	14 32·6	Ther. 64	1·662

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.		Remarks.
July 15.	−33° 51′	151 17	Def. S.	59 11·5	64	W.	1·696	+·007	1·703		
Aug. 1.	At anchor.		Def. S.	58 21·4	61	S.	1·733	−·032	1·701		
			Def. S.	58 15·6	61	S.S.W.	1·737	−·028	1·709	1·705	
3.			Def. S.	59 29·0	63	N.E.	1·684	+·025	1·709		
5.	Running out of harbour.		Def. S.	59 09·4	63	E. by N.	1·698	+·011	1·709		
			Def. N.	55 46·8	63	E. by N.	1·686	+·011	1·697		
6.	−32 52	154 07	Def. S.	59 23·6	63	E. by N.	1·686	+·011	1·694	1·694	
			Def. N.	55 52·6	63	E. by N.	1·681				
7.	−33 51	157 18	Def. S.	60 05·3	60	E. by N.	1·660	+·011	1·667	1·667	Much motion.
			Def. N.	56 30·2	61	E. by N.	1·652				
8.	−33 27	160 43	Def. S.	60 18·0	63	E. by N.	1·651	+·011	1·655	1·655	
			Def. N.	56 53·1	64	E. by N.	1·638				
9.	−33 38	163 42	Def. S.	60 24·0	60	E.	1·647	+·007	1·642	1·642	
			Def. N.	57 14·4	61	E.	1·623				
10.	−33 41	166 23	Def. S.	61 22·7	63	N.E.	1·609	+·025	1·625	1·625	
			Def. N.	58 01·2	61	N.E.	1·591				
11.	−33 22	167 40	Def. S.	61 19·8	65	E. by N.	1·611	+·012	1·617	1·617	
			Def. N.	57 49·4	67	E. by N.	1·599				
12.	−32 58	169 20	Def. S.	61 40·0	56	E.N.E.	1·598	+·017	1·607	1·607	
			Def. N.	58 14·8	56	E.N.E.	1·582				
13.	−32 12	170 27	Def. S.	62 24·2	56	S.E. by E.	1·572	−·012	1·562		
			Def. N.	58 24·4	55	S.E. by E.	1·576				Much motion.
15.	−33 55	171 54	Def. S.	61 35·7	60	E. ½ S.	1·590	+·004	1·593	1·583	A head sea.
			Def. N.	53 05·6	60	E. ½ S.	1·588				
17.	−34 29	173 36	Def. S.	61 20·0	62	E.S.E.	1·611	−·006	1·594		Much motion.
			Def. N.	58 02·7	62	E.S.E.	1·590				
20.	At anchor.		Def. S.	61 57·7	66	N.W. ½ N.	1·587	+·025	1·612	1·607	
			Def. S.	60 42·9	63	S.	1·634	−·032	1·602		
23.	Bay of Islands, New Zealand.		Def. S.	61 41·1	58		1·599				
			Def. N.	58 00·0	56		1·592				
	−35 16	174 00	wt. 6 grs.	50 38·1	58		1·604				
			wt. 5 grs.	40 10·5	58		1·594				
			wt. 4 grs.	30 55·0	59		1·597				
			wt. 3 grs.	22 47·5	59		1·578				
			wt. 2 grs.	14 59·3*	59		1·590				
Oct. 27.	−35 16	174 00	Def. S.	61 45·2	67	Observed	1·595	.....	1·594	1·594	The results with the face west are included in the mean.
			Def. N.	57 47·1	70	on shore.	1·600				
			wt. 6 grs.	50 35·0	71		1·608				
			wt. 5 grs.	39 59·3	70		1·603				
			wt. 4 grs.	30 30·6	70		1·619				
			wt. 3 grs.	22 45·0	70		1·583				
			wt. 2 grs.	14 43·2	68		1·620				
			Def. S.	61 54·4	65		1·590				
			Def. N.	58 09·1†	65		1·586				
Nov. 23.	−35 15	174 39	Def. S.	61 00·9	63	E.S.E.	1·623	−·006	1·611	1·611	
			Def. N.	57 29·1	63	E.S.E.	1·611				
24.	−36 27	177 34	Def. S.	61 26·7	65	E.S.E.	1·607	−·006	1·612	1·612	
			Def. N.	57 12·7	64	E.S.E.	1·625				

* Observed on shore; face west.

			Intensity.
wt. 6 grs.	51′ 26·0	Ther. 61	1·591
wt. 5 grs.	40 52·0	Ther. 60	1·590
wt. 4 grs.	30 26·9	Ther. 59	1·633
wt. 3 grs.	23 17·9	Ther. 59	1·568
wt. 2 grs.	15 23·3	Ther. 60	1·571

† Observed on shore; face west.

			Intensity.
wt. 6 grs.	51′ 38·7	Ther. 65	1·588
wt. 5 grs.	40 51·0	Ther. 65	1·591
wt. 4 grs.	31 29·2	Ther. 65	1·586
wt. 3 grs.	23 17·2	Ther. 64	1·570
wt. 2 grs.	15 11·1	Ther. 64	1·593

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.		Remarks.
	° ′	° ′		° ′	°						
Nov. 25.	−38 17	179 31	Def. S	60 44·4	62	S.E. by S.	1·633	−·020	1·614	1·614	
			Def. N.	56 57·2	62	S.E. by S.	1·634				
26.	−39 01	182 12	Def. S.	62 02·7	59	E. by S.	1·585	−·000	1·605	1·615	Very much motion.
			Def. N.	57 12·9	57	E. by S.	1·625				
27.	−39 18	182 58	Def. S.	60 16·0	64	S.	1·652	−·028	1·625		
			Def. N.	56 29·9	62	S.	1·654				
28.	−40 47	183 03	Def. S.	59 58·5	62	S.E. by E.	1·664	−·010	1·659	1·659	
			Def. N.	56 03·4	65	S.E. by E.	1·674				
29.	−41 49	183 41	Def. S.	59 05·1	65	S. by E.	1·701	−·026	1·671	1·671	
			Def. N.	55 37·2	65	S. by E.	1·693				
30.	−43 32	183 03	Def. S.	58 24·9	60	S. ½ W.	1·732	−·027	1·701	1·701	
			Def. N.	54 54·9	59	S. ½ W.	1·724				
Dec. 1.	−45 40	183 20	Def. S.	58 32·2	63	S.E. by E.	1·725	−·010	1·715	1·730	A head sea.
			Def. N.	54 58·7	63	S.E. by E.	1·722				
2.	−47 19	184 40	Def. S.	57 40·9	57	S.E. by E. ½ E.	1·762	−·008	1·745		A heavy swell.
			Def. N.	54 30·5	57	S.E. by E. ½ E.	1·744				
3.	−48 43	186 30	Def. S.	57 41·3	51	S.E. by E.	1·762	−·009	1·752	1·753	
			Def. N.	54 10·1	51	S.E. by E.	1·760				
			wt. 2 grs.	13 28·0	51	E.S.E.	1·765	−·005	1·760		
4.	−49 20	187 41	Def. S.	57 45·8	55	E. by S.	1·757	·000	1·752		
			Def. N.	54 13·1	55	E. by S.	1·758				
			wt. 3 grs.	20 30·2	53	E. by S.	1·745				
			wt. 4 grs.	27 58·0	53	E. by S.	1·750				
5.	−49 27	189 13	Def. S.	57 32·7	55	E. by S.	1·770	·000	1·759	1·759	
			Def. N.	54 16·0	55	E. by S.	1·757				
			wt. 3 grs.	20 18·0	56	E. by S.	1·762				
			wt. 4 grs.	27 32·0	56	E. by S.	1·775				
			wt. 5 grs.	36 30·1	56	E. by S.	1·729				
6.	−50 00	191 00	Def. S.	57 30·2	51	E. by S.	1·771	·000	1·763	1·766	
			Def. N.	54 13·5	51	E. by S.	1·758				
			wt. 3 grs.	20 22·2	51	E. by S.	1·754				
			wt. 4 grs.	27 16·5	51	E. by S.	1·789				
			wt. 5 grs.	36 07·2	51	E. by S.	1·742				
7.	−50 48	192 20	Def. S.	57 07·9	51	S.E. by E.	1·787	−·009	1·774		
			Def. N.	53 45·7	51	S.E. by E.	1·779				
8.	−51 34	194 29	Def. S.	57 06·4	52	E. by S.	1·789	·000	1·792	1·792	
			Def. N.	53 15·7	50	E. by S.	1·804				
			wt. 3 grs.	20 09·1	48	E. by S.	1·771				
			wt. 4 grs.	26 59·7	48	E. by S.	1·804				
			wt. 5 grs.	34 58·0	47	E. by S.	1·791				Weight 5, unsteady.
9.	−52 21	197 53	Def. S.	56 44·5	45	E. by S.	1·805	·000	1·801		
			Def. N.	53 25·1	44	E. by S.	1·797				
10.	−53 01	202 11	Def. S.	56 21·2	48	E. ½ N.	1·824	+·006	1·815	1·808	Much motion.
			Def. N.	53 27·0	47	E. ½ N.	1·794				
11.	−52 48	203 50	Def. N.	53 13·3	45	E.	1·807	+·003	1·809		A head swell.
			Def. S.	56 45·0	46	E.	1·805				
			wt. 3 grs.	19 57·7	46	E.	1·797				
12.	−53 01	205 08	Def. S.	56 37·4	45	E.S.E.	1·811	−·004	1·810	1·810	
			Def. N.	52 57·3	44	E.S.E.	1·818				
			wt. 3 grs.	19 46·7	45	E.S.E.	1·802				
			wt. 4 grs.	26 41·5	45	E.S.E.	1·823				
			wt. 5 grs.	34 25·7	45	E.S.E.	1·815				
13.	−54 55	209 30	Def. S.	56 08·7	52	S.E. by E. ½ E.	1·833	−·007	1·831	1·831	
			Def. N.	52 26·0	51	S.E. by E. ½ E.	1·846				
	−55 08	210 04	Def. S.	56 02·2	49	S.E. by E. ½ E.	1·839				
			Def. N.	52 30·7	48	S.E. by E. ½ E.	1·842				
	−55 20	210 28	Def. S.	56 10·0	45	S.E. by E. ½ E.	1·832				
			Def. N.	52 38·2	44	S.E. by E. ½ E.	1·836				

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.		Remarks.
Dec. 14.	−56 20	211 52	Def. S.	55 38·9	51	S.E. by S.	1·857				
			Def. N.	52 01·3	51	S.E. by S.	1·868				
			wt. 3 grs.	19 37·5	53	S.E. by S.	1·818				
			wt. 4 grs.	26 08·7	52	S.E. by S.	1·860	−·016	1·836	1·836	
			wt. 5 grs.	33 36·0	52	S.E. by S.	1·856				
			wt. 6 grs.	42 36·0	52	S.E. by S.	1·830				
	−56 55	211 38	Def. S.	55 33·2	43	S.E. by S.	1·863				
			Def. N.	51 59·7	43	S.E. by S.	1·868				
15.	−56 55	212 34	Def. S.	55 28·0	41	S.S.E.	1·865	−·017	1·843	1·850	
			Def. N.	52 17·0	40	S.S.E.	1·856				
	−57 21	212 46	Def. S.	55 29·8	42	E.S.E.	1·864	−·004	1·858		
			Def. N.	52 10·0	41	E.S.E.	1·860				
16.	−58 29	213 11	Def. S.	55 19·7	42	S.S.E.	1·872				
			Def. N.	51 52·9	42	S.S.E.	1·874				
	−58 52	213 22	Def. S.	54 57·6	41	S.S.E.	1·889				
			Def. N.	52 04·5	41	S.S.E.	1·865	−·017	1·873	1·873	
			wt. 3 grs.	18 32·2	38	S.S.E.	1·916				
			wt. 4 grs.	25 25·0	38	S.S.E.	1·906				
			wt. 5 grs.	32 31·2	38	S.S.E.	1·907				
17.	−61 03	213 57	Def. S.	54 19·2	39	S.S.E.	1·923	−·017	1·903	1·908	
			Def. N.	51 06·0	36	S.S.E.	1·918				
	−61 37	213 57	Def. S.	54 02·4	34	S. by E.	1·939	−·018	1·913		
			Def. N.	51 01·2	32	S. by E.	1·922				
18.	−62 40	212 53	Def. S.	53 43·6	34	S.	1·953	−·019	1·922	1·922	
			Def. N.	50 50·0	32	S.	1·931				
19.	−63 23	210 02	Def. S.	53 39·8	39	S.S.W.	1·958	−·017	1·939	1·939	
			Def. N.	50 26·0	38	S.S.W.	1·954				
			Def. S.	54 33·8	42	Observed on ice.	1·910	.....	1·923	1·923	
			Def. N.	50 44·7	45		1·936				
20.	−63 47	208 26	Def. S.	53 58·3	35	S. by W.	1·941	−·018	1·924	1·930	
			Def. N.	50 36·8	34	S. by W.	1·944				
			wt. 3 grs.	18 22·9	35	S.W. by S.	1·938				
			wt. 4 grs.	25 05·6	34	S.W. by S.	1·935	−·012	1·934		
			wt. 5 grs.	32 11·8	34	S.W. by S.	1·926				
			wt. 6 grs.	40 03·5	34	S.W. by S.	1·926				
21.	−64 38	206 53	Def. S.	54 00·1	32	S.	1·940	−·016	1·926	1·933	
			Def. N.	50 35·6	31	S.	1·944				
	−64 53	206 30	Def. S.	53 34·4	44	S. by W.	1·963	−·015	1·934		
			Def. N.	50 23·4	39	S. by W.	1·956				
			wt. 3 grs.	18 15·6	33	S. ½ E.	1·942	−·016	1·934		
			wt. 4 grs.	24 39·8	33	S.	1·959				
			wt. 5 grs.	31 35·1	33	S. by E.	1·955	−·015	1·939		
			wt. 6 grs.	39 11·3	33	S. by E.	1·954				
22.	−65 36	205 32	Def. S.	53 33·1	37	S.	1·964	−·016	1·954	1·955	Fast to a piece of ice.
			Def. N.	50 00·6	36	S.	1·977				
23.	−65 59	204 16	Def. S.	53 51·4	44	E.N.E.	1·948	+·006	1·954		
			Def. S.	53 38·5	37	S. by W.	1·959	−·013	1·964		
			Def. N.	49 48·2	36	S. by W.	1·996				
	−65 59	204 14	Def. S.	53 31·5	39	S.	1·965	−·014	1·956		
			Def. N.	50 05·6	35	S.	1·973				
24.	−65 58	203 51	Def. S.	53 21·6	43	S.W. by S.	1·976	−·010	1·957		
			Def. N.	50 19·8	43	S.W. by S.	1·959				
25.	−66 00	203 46	Def. S.	53 56·5	34	E.	1·943	+·002	1·953		
			Def. N.	50 19·4	35	E.	1·959				
26.	−66 11	203 36	Def. S.	53 43·3	30	S.E. by E.	1·955	−·005	1·954		
			Def. N.	50 16·2	30	S.E. by E.	1·963				
			Def. S.	54 01·9	30	N.W.	1·939	+·010	1·953		
29	−66 24	203 51	Def. S.	53 51·7	42	N.E.	1·947				

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
	° ′	° ′		°	°					
Jan. 1.	−66 32	203 32	Def. S.	53 23·8	44	S.S.E.	1·972	−·012	1·966	
			Def. N.	49 53·5	44	S.S.E.	1·984			
									1·965	
3.	−66 35	203 25	Def. S.	53 48·9	39	N. by w. ½ w.	1·950	+·012	1·965	Fast to a piece of ice, the Terror distant 25 fathoms. (This result is not employed in the Map.)
			Def. N.	50 21·7	37	N. by w. ½ w.	1·957			
6.	−66 06	204 24	Def. S.	53 28·7	41	S.	1·967			
			Def. N.	50 01·7	38	S.	1·976			
			wt. 3 grs.	18 01·8	37	S.	1·964			
			wt. 4 grs.	24 44·9	37	S.	1·953			
			wt. 5 grs.	30 55·2	36	S.	1·994	−·014	1·955	
			wt. 6 grs.	38 50·1	36	S.	1·970			
									1·954	
7.	−66 13	204 25	Def. S.	53 38·9	33	S.	1·958			
			Def. N.	50 07·5	32	S.	1·971			Sailing through loose ice.
8.	−66 12	204 33	Def. S.	53 50·4	35	N.W.	1·948	+·010	1·958	
			Def. N.	50 32·2	35	N.W.	1·948			
			Def. S.	53 47·9	34	S.S.E.	1·951	−·012	1·939	
10.	−65 59	204 12	Def. S.	53 49·5	36	S.W. by w.	1·949	−·005	1·947	
			Def. N.	50 25·4	30	S.W. by w.	1·955			
			Def. N.	50 15·4	30	E.	1·964			
			wt. 3 grs.	18 09·9	30	E.	1·951			
			wt. 4 grs.	24 37·5	30	E.	1·960	+·002	1·966	
			wt. 5 grs.	31 12·1	30	E.	1·975			
			wt. 6 grs.	38 45·9	30	E.	1·971			
									1·957	
12.	−65 54	203 32	Def. S.	53 33·4	32	S.W.	1·963	−·008	1·955	
13.	−66 12	203 05	Def. S.	53 41·3	40	S.S.E.	1·957	−·012	1·949	
			Def. N.	50 13·9	36	S.S.E.	1·965			
			Def. S.	54 11·3	30	N.N.E.	1·932	+·012	1·946	
			Def. N.	50 46·1	30	N.N.E.	1·935			
16.	−65 49	202 02	Def. S.	54 03·1	45		1·938			
			Def. N.	50 35·0	45		1·945			
			wt. 2 grs.	12 13·0	50		1·940			
			wt. 3 grs.	18 32·4	54	Observed on ice.	1·992	.....	1·943	1·943
			wt. 4 grs.	24 49·3	54		1·952			
			wt. 5 grs.	32 02·4	54		1·936			
			wt. 6 grs.	39 31·4	55		1·946			
21.	−66 49	202 40	Def. S.	53 19·1	37	S. by E.	1·975	−·013	1·961	
			Def. N.	50 05·6	36	S. by E.	1·973			
28.	−67 33	204 01	Def. N.	50 24·8	34	N.	1·955	+·012	1·967	
29.	−67 32	203 59	Def. S.	53 28·8	31	S.S.W.	1·967	−·012	1·957	
			Def. N.	50 08·2	30	S.S.W.	1·971			
									1·960	
30.	−67 18	203 39	Def. S.	53 35·7	38	S.W. ½ S.	1·961			
			Def. N.	50 06·7	36	S.W. ½ S.	1·972	−·009	1·959	
			wt. 3 grs.	18 00·0	34	S.W. ½ S.	1·970			
31.	−67 21	202 15	Def. S.	53 36·7	35	S.W.	1·961			
			Def. N.	50 08·2	32	S.W.	1·971			
			wt. 3 grs.	18 19·6	33	S.W.	1·936			
			wt. 4 grs.	24 44·5	33	S.W.	1·953	−·008	1·951	1·951
			wt. 5 grs.	31 23·7	35	S.W.	1·965			
			wt. 6 grs.	38 52·0	35	S.W.	1·968			
Feb. 2.	−68 07	200 15	Def. S.	53 23·2	31	S.S.E. ½ E.	1·972	−·011	1·971	
			Def. N.	49 46·2	31	S.S.E. ½ E.	1·992			
3.	−68 21	200 03	Def. S.	52 54·7	32	S.E. by S.	1·997	−·010	1·981	
			Def. N.	49 52·6	31	S.E. by S.	1·985			
									1·975	
4.	−68 42	199 44	Def. S.	52 57·1	33	S. ½ E.	1·995			Much motion.
			Def. N.	49 51·4	30	S. ½ E.	1·987			
			wt. 3 grs.	18 05·7	30	S. ½ E.	1·961	−·014	1·974	
			wt. 4 grs.	23 55·7	29	S. ½ E.	2·014			
			wt. 5 grs.	31 02·0	30	S. ½ E.	1·985			

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.		Remarks.
Feb. 5.	−68° 59′	195° 51′	Def. S.	53° 13′·7	33°	S.W. by S.	1·981	−·004	1·972		
			Def. N.	50 07·0	32	S.W. by S.	1·972				
6.	−69 48	192 25	Def. S.	52 42·1	36	S. by W.	2·010	−·008	1·991		
			Def. N.	49 49·0	34	S. by W.	1·989			1·985	A great deal of motion.
7.	−70 05	191 10	Def. S.	52 46·1	29	S.W.	2·006	−·005	2·008		
			Def. N.	49 18·3	29	S.W.	2·020				
			Def. S.	53 21·7	33	S.S.W.	1·973	−·007	1·972		
			Def. N.	49 52·7	30	S.S.W.	1·985				
8.	−70 18	186 01	Def. S.	53 05·0	37	S.	1·989				
			Def. N.	49 46·8	33	S.	1·991				
			wt. 3 grs.	18 21·8	31	S.	1·931				
			wt. 4 grs.	24 06·1	31	S.	2·001	−·009	1·977	1·980	
			wt. 5 grs.	30 40·6	31	S.	2·006				
			wt. 6 grs.	38 05·3	30	S.	2·001				
9.	−70 39	185 31	Def. S.	52 56·5	32	S.E. by S.	1·996	−·006	1·987		
			Def. N.	49 47·4	29	S.E. by S.	1·991				
10.	−70 06	181 50	Def. S.	53 09·0	33	W. by S.	1·985	·000	1·981		A head swell.
			Def. N.	50 00·2	31	W. by S.	1·978				
11.	−70 10	181 34	Def. N.	50 03·7	33	S.W.	1·975	−·005	1·972	1·983	Much motion.
12.	−71 00	180 44	Def. S.	52 49·2	33	S.E. by S.	2·003	−·005	1·992		
			Def. N.	49 45·7	32	S.E. by S.	1·992				A heavy cross sea.
13.	−72 46	181 46	Def. S.	52 55·6	34	S.E. by S.	1·997				
			Def. N.	49 45·5	32	S.E. by S.	1·992				
			wt. 3 grs.	18 17·2	31	S.E. by S.	1·940	−·003	1·973	1·973	
			wt. 4 grs.	24 23·0	31	S.E. by S.	1·975				
16.	−74 56	173 36	Def. S.	53 16·1	26	S.S.E.	1·979				
			Def. N.	49 49·5	26	S.S.E.	1·988	−·003	1·998		
			wt. 3 grs.	17 23·0	26	S.S.E.	2·036				
	−75 10	173 08	Def. S.	52 39·5	36	E.	2·017				
			Def. N.	49 45·9	30	E.	1·992			2·008	Very unsteady.
			wt. 3 grs.	17 20·9	27	E.	2·039				
			wt. 4 grs.	23 58·7	27	E.	2·009	+·001	2·009		
			wt. 5 grs.	30 59·1	28	E.	1·987				
			wt. 6 grs.	38 02·3	27	E.	2·002				
17.	−76 00	175 15	Def. S.	52 38·3	33	E.N.E.	2·014	+·002	2·010		
			Def. N.	49 33·5	31	E.N.E.	2·004				
18.	−76 58	181 03	Def. S.	53 00·7	28	E.N.E.	1·993	+·002	2·003	2·005	
			Def. N.	49 29·3	27	E.N.E.	2·009				
19.	−76 42	184 09	Def. S.	53 06·2	25	N. by E.	1·988	+·004	2·001		
			Def. N.	49 31·3	25	N. by E.	2·007				Ship pitching.
22.	−76 42	194 48	Def. S.	52 59·0	30	N. by E.	1·993				
			Def. N.	49 41·0	28	N. by E.	1·997	+ 004	1·999		
	−77 05	194 38	Def. S.	53 10·6	36	E. by S.	1·984				
			Def. N.	49 57·5	33	E. by S.	1·981			1·993	A swell from the south.
			wt. 3 grs.	18 06·5	29	E. by S.	1·960				
			wt. 4 grs.	23 18·7	29	E. by S.	2·063	+·001	1·991		
			wt. 5 grs.	31 25·7	29	E. by S.	1·961				
			wt. 6 grs.	38 04·1	29	E. by S.	2·000				
25.	−74 50	193 45	Def. S.	53 14·8	30	W.	1·980	+·001	1·983	1·983	
			Def. N.	49 54·3	29	W.	1·984				
26.	−72 46	189 59	Def. S.	53 30·5	37	N.W. by W.	1·966	+·002	1·972		
			Def. N.	50 04·5	31	N.W. by W.	1·974			1·974	
27.	−72 01	187 35	Def. S.	53 32·7	26	W. by S.	1·964	+·000	1·976		
			Def. N.	49 49·1	25	W. by S.	1·989				
28.	−71 08	184 59	Def. S.	53 27·6	31	W.	1·968	+·001	1·975		
			Def. N.	49 57·0	26	W.	1·981			1·993	
			wt. 3 grs.	17 39·5	25	W.S.W.	2·004	·000	2·012		
			wt. 4 grs.	23 52·0	25	W.S.W.	2·020				

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.		Remarks.
	° ′	° ′		° ′	°						
Mar. 1.	−69 52	180 00	Def. S.	53 10·7	33	W. by N.	1·983	+·003	1·980	1·978	A swell from the northward.
			Def. N.	50 06·0	31	W. by N.	1·972				
	−69 44	179 53	Def. S.	53 28·1	32	N. by E.	1·968	+·007	1·976		
			Def. N.	50 09·7	29	N. by E.	1·969				
2.	−68 04	183 25	Def. S.	54 05·0	33	N.N.E.	1·936	+·008	1·962	1·965	
			Def. N.	50 06·7	32	N.N.E.	1·972				
			Def. S.	53 46·5	34	N.E. by N.	1·951	+·008	1·969		
			Def. N.	50 09·3	32	N.E. by N.	1·970				
3.	−67 32	185 09	Def. S.	53 24·5	30	E.N.E.	1·971	+·005	1·976	1·964	
			Def. N.	50 08·8	31	E.N.E.	1·971				
5.	−67 16	188 10	Def. N.	50 40·2	35	N. by E.	1·941	+·010	1·952		
6.	−65 25	191 48	Def. N.	50 38·3	34	N. by E.	1·943				A very heavy swell from westward, observations very uncertain.
7.	−63 30	194 52	Def. S.	54 11·9	40	N. by E.	1·930				
			Def. N.	50 54·2	35	N. by E.	1·927	+·010	1·936	1·925	
			wt. 3 grs.	18 26·2	33	N. by E.	1·925				
			wt. 4 grs.	25 10·3	33	N. by E.	1·922				
8.	−62 16	196 10	Def. S.	54 52·7	35	N. by E.	1·893	+·010	1·903		
			Def. N.	51 32·2	35	N. by E.	1·893				
9.	−61 14	198 38	Def. S.	54 38·4	43	N.E. by N.	1·907				
			Def. N.	51 23·2	35	N.E. by N.	1·902				
			wt. 3 grs.	19 06·9	33	N.E. by N.	1·859	+·013	1·914	1·909	
			wt. 4 grs.	25 25·5	35	N.E. by N.	1·905				
			wt. 5 grs.	32 00·5	34	N.E. by N.	1·933				
	−60 50	200 11	Def. S.	55 00·4	38	E.N.E.	1·888	+·007	1·895		
			Def. N.	51 37·2	35	E.N.E.	1·888				
10.	−60 18	204 11	Def. S.	55 52·5	35	E. by N.	1·844				
			Def. N.	51 56·5	34	E. by N.	1·871	+·005	1·869	1·869	Cross sea, ship very unsteady.
12.	−60 13	211 34	Def. S.	55 28·0	35	E. by N.	1·862				A heavy swell, very unsteady.
			Def. N.	51 47·5	35	E. by N.	1·879				
14.	−59 24	218 58	Def. S.	55 52·2	37	N.E. by E.	1·846				A heavy swell, very unsteady.
			Def. N.	52 20·0	37	N.E. by E.	1·851	+·011	1·863	1·863	
	−59 16	219 30	Def. S.	55 37·4	37	N.E. by E.	1·859				
			Def. N.	52 18·2	37	N.E. by E.	1·853				
15.	−58 04	222 04	Def. S.	55 54·2	37	E.N.E.	1·844				
			Def. N.	52 16·4	37	E.N.E.	1·844	+·009	1·864		
			wt. 3 grs.	18 57·0	38	E.N.E.	1·876				
16.	−59 04	228 57	Def. S.	55 28·7	39	E.	1·864	+·002	1·869		
			Def. N.	51 57·5	39	E.	1·870				
17.	−59 39	232 48	Def. S.	55 21·3	39	E. ½ S.	1·872			1·875	A great deal of motion.
			Def. N.	51 57·5	39	E. ½ S.	1·870				
	−59 45	233 53	Def. S	55 12·0	40	E. ½ S.	1·879	+·001	1·878		
			Def. N.	51 41·2	38	E. ½ S.	1·885				
18.	−60 16	236 11	Def. S.	54 40·7	36	E. by S.	1·901				Very unsteady.
			Def. N.	51 33·2	35	E. by S.	1·893	·000	1·897	1·894	
			Def. S.	55 00·2	37	E.	1·888				
	−60 21	237 02	Def. S.	55 12·5	39	E.	1·879	+·003	1·892		Ship rolling, very unsteady.
			Def. N.	51 25·6	39	E.	1·899				
	−60 20	237 50	Def. S.	55 33·4	39	E. by N.	1·862				
			Def. N.	51 25·5	39	E. by N.	1·899	+·009	1·890	1·892	
	−60 19	238 00	Def. S.	55 10·2	40	E. by N. ½ N.	1·880				
			Def. N.	51 37·9	39	E. by N. ½ N.	1·887	+·010	1·894		
19.	−60 01	241 38	Def. S.	55 58·9	39	E.N.E.	1·841				Much motion.
			Def. N.	52 25·0	37	E.N.E.	1·846				
			Def. S.	56 13·5	42	E.N.E.	1·829	+·011	1·851	1·846	
			Def. N.	52 30·0	40	E.N.E.	1·842				
21.	−59 15	248 12	Def. S.	56 07·0	39	E. by N.	1·836				
			Def. N.	52 51·5	38	E. by N.	1·824	+·009	1·839		
	−58 58	249 24	Def. S.	56 11·2	39	N.E. by E.	1·831				
			Def. N.	52 56·0	38	N.E. by E.	1·820	+·015	1·841		

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.		Remarks.
	° ′	° ′		° ′	°						
Mar. 22.	−58 29	252 22	Def. S.	56 30·5	38	E. ½ S.	1·816	+·002	1·816		
			Def. N.	53 05·6	38	E. ½ S.	1·812				
23.	−58 33	255 10	Def. S.	56 36·0	34	E. ½ N.	1·812			1·807	A head sea.
			Def. N.	53 13·2	33	E. ½ N.	1·807				
25.	−58 44	257 49	Def. S.	56 35·8	36	E. ½ N.	1·812	+·006	1·804		
			Def. N.	53 16·7	35	E. ½ N.	1·803				
			wt. 3 grs.	20 17·0	34	E. ½ N.	1·756				
26.	−59 02	268 30	Def. S.	57 19·2	47	E. by N. ½ N.	1·778	+·012	1·783		
			Def. N.	54 05·2	45	E. by N. ½ N.	1·763				
27.	−59 02	272 02	Def. S.	58 55·6	37	E.N.E.	1·707	+·014	1·722	1·733	Ship unsteady.
			Def. N.	55 17·7	35	E.N.E.	1·708				
28.	−58 50	277 12	Def. S.	59 34·0	40	N.E. by E.	1·681	+·018	1·694		
			Def. N.	56 07·7	39	N.E. by E.	1·671				
29.	−58 23	280 03	Def. S.	60 45·2	44	N.E. ½ E.	1·633	+·019	1·651		
			Def. N.	57 03·0	45	N.E. ½ E.	1·631				
30.	−58 29	282 04	Def. S.	60 30·3	40	N.E. by E. ½ E.	1·643	+·016	1·651	1·639	
			Def. N.	57 08·2	40	N.E. by E. ½ E.	1·627				
31.	−58 29	286 04	Def. N.	58 34·2	45	N.E. by N.	1·570	+·024	1·594		A heavy swell from the southward.
Apr. 1.	−57 22	289 50	Def. S.	63 22·7	47	N.E. by N.	1·539	+·025	1·554		
			Def. N.	60 00·8	47	N.E. by N.	1·519			1·532	
2.	−57 10	292 11	Def. S.	63 27·2	44	S.E.	1·535	−·017	1·510		
			Def. N.	59 57·5	44	S.E.	1·520				
3.	−56 40	294 46	Def. S.	65 38·2	46	N.E.	1·465				
			Def. N.	61 36·2	45	N.E.	1·469	+·023	1·466	1·466	
4.	−54 50	298 10	Def. N.	64 10·7	44	N.E.	1·395				
5.	−52 54	300 57	Def. S.	70 13·4	48	N.N.E.	1·342				
			Def. N.	66 55·7	45	N.N.E.	1·327				
			wt. 3 grs.	27 57·7	43	N.N.E.	1·300	+·025	1·355	1·355	
			wt. 4 grs.	37 33·2	44	N.N.E.	1·340				
			wt. 5 grs.	49 40·7	44	N.N.E.	1·343				
11.	Port Louis, Falkland Islands.		Def. S.	70 51·3	47		1·328				
			Def. N.	67 08·1	47		1·322				
	−51 32	301 53	wt. 2 grs.	18 31·1	45		1·291				
			wt. 3 grs.	27 42·7	45		1·311				
			wt. 4 grs.	37 58·5	43		1·331				
			wt. 5 grs.	48 55·9	43		1·361				
			wt. 6 grs.	66 49·8*	43	Observed	1·345	.....	1·322	1·322	The results with the "face west" are included in the mean.
Aug. 19.			wt. 2 grs.	17 57·1	37	on shore.	1·330				
			wt. 3 grs.	27 43·3	37		1·310				
			wt. 4 grs.	37 40·4	37		1·339				
			wt. 5 grs.	49 31·4	38		1·347				
			wt. 6 grs.	67 23·4*	38		1·339				
			Def. S.	71 32·4	34		1·311				
			Def. N.	67 12·6	35		1·320				

* Observed on shore; face west.

		Temp.	Intensity.
wt. 2 grs.	18 50·4	42	1·287
wt. 3 grs.	28 30·0	42	1·296
wt. 4 grs.	38 51·0	41	1·315
wt. 5 grs.	51 27·9	41	1·326
wt. 6 grs.	68 40·3	41	1·332
wt. 2 grs.	18 32·9	39	1·306
wt. 3 grs.	28 26·6	40	1·299
wt. 4 grs.	39 05·3	40	1·309
wt. 5 grs.	51 19·2	40	1·329
wt. 6 grs.	69 35·7	40	1·324

Observations of the Intensity of the Magnetic Force made in Her Majesty's Ship Terror, with Needle F. C. B., between April 16, 1841, and August 15, 1842.

Observers Captain Francis Rawdon Crozier, and Mr. Thomas Moore, Mate, R.N.

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Apr. 17.	Hobarton Magnetic Observatory.		Def. S.	° ′ ″ 33 20·4	60					A spare needle marked C. was used as a deflector, and the observations with it are those registered as "Deflector S." and "Deflector N." The deflecting magnets belonging to the apparatus were also employed, N alone, and N. and S. conjointly. The observations with these are distinguished as "Mag. N." and "Mag. N.S." The temperatures are taken from the register in the Erebus.
			Mag. N.S.	39 59·2	60					
	−42 52	147 24	Mag. N.	30 04·0	60					
			Def. S.	21 03·1	60					
19.			wt. 1 gr.*	12 11·9	60					
			wt. 1½ gr.	18 29·4	60					
			wt. 2 grs.	25 13·7	60	Observed on shore.	1·820	.....	1·820	
			wt. 2½ grs.	31 43·0	60					
			wt. 3 grs.	39 02·3	60					
			wt. 3½ grs.	46 51·3	60					
20.			Def. N.	36 00·6	60					
			Def. S.	33 25·6	60					
			Mag. N.S.	40 11·6	60					
			Mag. N.	30 24·1	60					
June 22.	At anchor in the river Derwent.		Def. N.	35 58·5	48	W.	1·821			
			Def. N.	35 49·1	48	W.S.W.	1·831			
			Def. N.	35 34·5	48	S.W.	1·844			
			Def. N.	35 09·6	48	S.S.W.	1·868			
			Def. N.	35 09·3	48	S.	1·868			
			Def. N.	34 58·0	48	S.S.E.	1·879			
			Def. N.	35 00·0	48	S.E.	1·877			
			Def. N.	34 59·9	48	E.S.E.	1·877			
			Def. N.	35 06·4	48	E.	1·871			
			Def. N.	35 13·9	48	E.N.E.	1·863			
			Def. N.	35 18·4	48	N.E.	1·859			
			Def. N.	35 21·6	48	N.N.E.	1·857			
			Def. N.	35 23·0	48	N.	1·855			
			Def. N.	35 23·7	48	N.N.W.	1·854			
			Def. N.	36 04·1	48	N.W.	1·816			
			Def. N.	35 21·4	48	W.N.W.	1·857			
July 7.	Storm Bay.		Def. N.	34 57·0	48	S.E. ½ E.	1·880	−·012	1·860	Very steady.
			Def. S.	32 40·0	48	S.E. ½ E.	1·864			
8.	−43 03	148 20	Def. N.	35 23·6	52	W. ½ N.	1·854	+·006	1·849	Very steady.
			Def. S.	33 11·5	52	W. ½ N.	1·832			
9.	−42 24	149 30	Def. N.	36 03·7	56	N.N.W.	1·816	+·022	1·822	Very steady.
			Def. S.	33 57·6	56	N.N.W.	1·785			
10.	−40 51	149 28	Def. N.	36 33·8	56	N. by W.	1·787	+·025	1·814	Very steady.
			Def. S.	33 51·3	56	N. by W.	1·792			
11.	−38 17	150 22	Def. N.	36 46·1	56	N. by E.	1·775	+·027	1·785	Very steady.
			Def. S.	34 43·3	56	N. by E.	1·741			
12.	−37 28	151 30	Def. N.	37 09·4	61	N.E. ½ N.	1·752	+·023	1·758	Slight motion.
			Def. S.	35 06·4	61	N.E. ½ N.	1·718			Steering very steady.
13.	−36 21	151 39	Def. N.	37 15·1	58	N.N.W. ½ W.	1·747	+·026	1·738	Heavy cross sea, unsteady.
14.	−34 06	151 19	Def. N.	38 06 6	60	N.	1·697	+·031		
			Def. S.	35 42·8	60	N.	1·681			A slight motion. Steering steady.
19.	Garden Island, Port Jackson.		Def. N.	38 05·9	60	Observed on shore.	1·697			
	−33 51	151 17	Def. S.	35 15·7	60		1·708			

* Observed on shore; face west.

wt. 1 gr.	° ′ ″ 11 42·0	Intensity 1·820
wt. 1½ gr.	17 52·6	
wt. 2 grs.	24 15·6	
wt. 2½ grs.	31 00·7	
wt. 3 grs.	38 42·3	
wt. 3½ grs.	46 06·3	

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
July 19.	Garden Island, Port Jackson.		Mag. N.S.	41° 45·3	60	Observed on shore.	1·705			
			Mag. N.	31 47·2	60		1·696			
			Mag. S.	22 06·6	60					
			wt. 1 gr.*	13 08·8	60		1·691			
			wt. 1½ gr.	20 02·0	60		1·685	.....	1·699	Including the results with the "face west."
			wt. 2 grs.	27 00·7	60		1·708			
			wt. 2½ grs.	34 25·2	60		1·692			
			wt. 3 grs.	42 06·9	60		1·709			
			wt. 3½ grs.	51 13·5	60		1·703			
Aug. 5.	Running out of harbour.		Def. N.	37 45·1	63	E. by N. ½ N.	1·718			
			Def. S.	35 36·2	63	E. by N. ½ N.	1·688	+·014	1·719	A head swell.
			Def. N.	37 36·2	63	E. by N. ½ N.	1·726			
			Def. S.	35 34·5	63	E. by N. ½ N.	1·690			
6.	—34 01	153 17	Def. N.	38 06·3	63	E. by N.	1·698			
			Def. S.	36 11·3	63	E. by N.	1·654	+·011	1·703	
	—33 54	153 54	Def. N.	37 32·3	63	E. by N.	1·731			
			Def. S.	35 38·8	63	E. by N.	1·685			
7.	—33 56	156 38	Def. N.	38 16·4	61	E. by N.	1·688	+·011	1·679	Steering wildly, much motion.
			Def. S.	36 19·2	61	E. by N.	1·647			
8.	—33 31	160 20	Def. N.	38 36·0	63	E. by N.	1·669	+·011	1·671	A good deal of motion, steering tolerably.
			Def. S.	36 13·2	63	E. by N.	1·652			
9.	—33 42	163 34	Def. N.	38 58·3	61	E.	1·648			
			Def. S.	36 16·0	61	E.	1·650	+·007	1·658	Much motion, steering badly.
		164 05	Def. N.	38 46·2	61	E.	1·659			
			Def. S.	36 18·3	61	E.	1·648			Motion violent, steering wild.
10.	—33 47	166 39	Def. N.	38 57·3	62	E. by N. ½ N.	1·648	+·014		
			Def. S.	37 01·9	62	E. by N. ½ N.	1·604		1·627	A long swell, motion quick, steering well.
	—33 42	166 36	Def. N.	39 30·7	62	E.	1·616			
			Def. S.	36 57·2	62	E.	1·609	+·007		
			Mag. N.	32 50·1	62	E.	1·609			
			Mag. S.	23 37·2	62	E.				
11.	—33 34	167 37	Def. N.	40 07·5	66	N.E. by E.	1·579			
			Def. S.	37 58·5	66	N.E. by E.	1·549			
			Mag. N.	33 03·0	66	N.E. by E.	1·592	+·020	1·600	
			Mag. S.	23 12·0	66	N.E. by E.				Light wind, heavy swell, with quick motion.
			Mag. N.S.	43 13·0	66	N.E. by E.	1·590			
			Def. N.	39 46·4	66	E.	1·600	+·007		
12.	—32 58	169 20	Def. N.	40 10·5	56	E.N.E.	1·576			
			Def. S.	37 19·5	56	E.N.E.	1·586	+·018		
			Mag. N.	32 56·3	56	E.N.E.	1·601		1·607	
			Mag. S.	24 07·8	56	E.N.E.				Wind fresh, motion quick, steering badly.
			Mag. N.S.	43 17·9	56	N.E.	1·585	+·026		
13.	—32 12	170 27	Def. N.	39 31·5	55	S.E. by E.	1·615			A head sea, steering steadily.
			Def. S.	37 17·6	55	S.E. by E.	1·588			
14.	—32 11	171 20	Def. N.	38 55·5	55	S.E. by E.	1·650			
			Def. S.	36 58·7	55	S.E. by E.	1·607	—·012	1·589	Strong wind, heavy sea, motion quick, ship steering well.
			Mag. N.	33 30·8	55	S.E. by E.	1·554			
			Mag. N.S.	43 09·9	55	S.E. by E.	1·595			
			Mag. S.	23 34·3	55	S.E. by E.				

* Observed on shore; face west.

		Intensity.
wt. 1 gr.	12° 44·1	1·674
wt. 1½ gr.	19 03·3	1·712
wt. 2 grs.	26 01·2	1·705
wt. 2½ grs.	33 17·7	1·709
wt. 3 grs.	41 35·2	1·715
wt. 3½ grs.	51 02·1	1·687

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Aug. 15.	−33 55	171 59	Def. N.	39 35·3	60	E. by S.	1·611	·000		
			Def. N.	39 46·2	60	E. ½ N.	1·600	+·010		
	−33 58	172 06	Def. N.	39 09·4	60	E.S.E.	1·637		1·601	A head sea, table very unsteady.
			Def. S.	37 06·3	60	E.S.E.	1·600	−·006		
			Mag. N.	33 20·9	60	E.S.E.	1·566			
			Mag. N.S.	43 00·2	60	E.S.E.	1·609			
			Mag. S.	23 21·3	60	E.S.E.				
16.	−34 15	172 50	Def. N	39 43 1	61	N.W. by N.	1·603			
			Def. S.	37 44·5	61	N.W. by N.	1·562	+·029		
			Mag. N.	33 10·3	61	N.W. by N.	1·583		1·597	A head sea, wind strong, steering well.
			Mag. N.S.	43 25·9	61	N.W. by N.	1·573			
			Mag. S.	23 38·1	61	N.W. by N.				
			Mag. N.S.	43 40·5	61	E. by S. ½ S.	1·554	−·004		Heavy swell, steering well.
17.	−34 24	173 43	Def. N.	38 52·7	62	E. by S. ½ S.	1·653			
			Def. S.	36 57·2	62	E. by S. ½ S.	1·609			
			Mag. N.	32 46·0	62	E. by S. ½ S.	1·616	−·004	1·619	Strong wind, good deal of motion.
			Mag. N.S.	42 50·3	62	E. by S. ½ S.	1·622			
			Mag. S.	23 06·2	62	E. by S. ½ S.				
18.	?	?	Def. N.	38 54·8	64	S.W.	1·631	−·018		A heavy sea, steering wild.
21.	Bay of Islands, New Zealand.		Def. N.	39 40·9	59		1·606			
			Def. S.	36 59·8	59		1·606			
			Mag. N.	32 50·2	59		1·610			
	−35 16	174 00	Mag. N.S.	43 01·9	59		1·606			
			Mag. S.	23 37·6	59					
			wt. 1 gr.*	14 03·2	59		1·584			
			wt. 1½ gr.	21 17·9	59		1·601			
			wt. 2 grs.	28 22·1	59		1·633			
			wt. 2½ grs.	36 50·7	59		1·596			
			wt. 3 grs.	44 58·3	59		1·622			
			wt. 3½ grs.	55 09·9	59	Observed on shore.	1·618	.....	1·608	At the Magnetic Observatory. (The results with "face west" are included in the mean.)
Oct. 29.			Def. N.	39 32·8	64		1·613			
			Def. S.	36 57·6	64		1·608			
			Mag. N.	32 51·5	64		1·608			
			Mag. N.S.	42 54·9	64		1·616			
			Mag. S.	23 37·6	64					
			wt. 1 gr.†	13 51·7	64		1·606			
			wt. 1½ gr.	20 53·0	64		1·620			
			wt. 2 grs.	28 22·4	64		1·633			
			wt. 2½ grs.	37 05·6	64		1·587			
			wt. 3 grs.	45 02·2	64		1·621			
			wt. 3½ grs.	55 19·1	64		1·616			
Nov. 23.	Running out of Bay of Islands, off Arch Point.		Def. N.	39 41·1		E. by S.	1·605	+·004	1·610	Ship steady, about one mile off shore.
			Def. S.	36 59·1		E. by S.	1·607			
24.	−36 20	177 27	Def. N.	39 11·0		E.S.E.	1·635			
			Def. S.	36 24·1		E.S.E.	1·642	+·001	1·616	Ship not very steady, a sea from S.W.
			Mag. N.	33 07·5		E.S.E.	1·586			
			Mag. N.S.	43 07·0		E.S.E.	1·599			
			Mag. S.	23 09·3		E.S.E.				

* Observed on shore; face west.

	Angle of deflection.	Intensity.
wt. 1 gr.	13 24·3	1·592
wt. 1½ gr.	20 30·5	1·595
wt. 2 grs.	27 46·9	1·605
wt. 2½ grs.	35 43·0	1·607
wt. 3 grs.	44 38·7	1·619
wt. 3½ grs.	55 23·7	1·594

† Observed on shore; face west.

	Angle of deflection.	Intensity.
wt. 1 gr.	13 26·8	1·588
wt. 1½ gr.	20 16·4	1·616
wt. 2 grs.	27 38·8	1·613
wt. 2½ grs.	35 45·1	1·606
wt. 3 grs.	44 47·7	1·616
wt. 3½ grs.	55 26·4	1·594

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
	° ′	° ′		° ′	°					
Nov. 25.	−38 00	179 34	Def. N.	39 01·2		S.E. by S.	1·645			
			Def. S.	36 28·2		S.E. by S.	1·638	−·018		A head sea, table not very steady.
			Mag. N.	32 25·3		S.E. by S.	1·645			
			Mag. N.S.	42 31·1		S.E. by S.	1·647			
			Mag. S.	23 06·8		S.E. by S.			1·634	
	−38 27	179 59	Def. N.	38 52·4		S.E. by E. ½ E.	1·654			
			Def. S.	36 29·4		S.E. by E. ½ E.	1·637	−·002		A sea from the S.W., ship unsteady.
			Mag. N.	32 22·4		S.E. by E. ½ E.	1·643			
			Mag. N.S.	42 30·0		S.E. by E. ½ E.	1·648			
			Mag. S.	22 37·9		S.E. by E. ½ E.				
26.	−38 48	182 05	Def. N.	39 12·6		E.S.E.	1·633	+·001		
			Def. S.	36 36·7		E.S.E.	1·629			Ship very steady, steering well.
			Def. N.	39 06·7		S.E.	1·639			
			Def. S.	36 32·6		S.E.	1·633			
			Mag. N.	32 23·2		S.E.	1·648	−·013	1·640	
			Mag. N.S.	42 20·3		S.E.	1·662			
			Mag. S.	22 23·4		S.E.				
	−39 02	182 05	Def. N.	38 54·4		E.S.E.	1·653			
			Def. S.	36 15·2		E.S.E.	1·650	+·001		Head sea, much motion.
			Mag. N.	32 30·5		E.S.E.	1·638			
			Mag. N.S.	42 19·3		E.S.E.	1·663			
			Mag. S.	22 25·8		E.S.E.				
27.	−39 14	182 54	Def. N.	38 52·7	63	S.E. by E.	1·653			
			Def. S.	36 27·2	63	S.E. by E.	1·639	−·006		A swell from the S.E., ship steady.
			Mag. N.	32 35·6	63	S.E. by E.	1·631			
			Mag. N.S.	42 34·9	63	S.E. by E.	1·641			
			Mag. S.	22 45·9	63	S.E. by E.				
	−39 31	183 00	Def. N.	38 39·5	63	S. by E.	1·666			
			Def. S.	35 59·9	63	S. by E.	1·665	−·024		Steering well, ship steady.
			Mag. N.	32 11·1	63	S. by E.	1·663			
			Mag. N.S.	42 13·5	63	S. by E.	1·666			
			Mag. S.	22 43·5	63	S. by E.			1·652	
28.	−40 35	183 00	Def. N.	38 32·3	64	E.S.E.	1·673			
			Def. S.	35 52·8	64	E.S.E.	1·672	·000		
			Mag. N.	32 12·2	64	E.S.E.	1·662			Very steady.
			Mag. N.S.	41 59·7	64	E.S.E.	1·686			
			Mag. S.	22 29·6	64	E.S.E.				
	−40 50	183 11	Def. N.	38 27·2	64	S.S.E. ½ E.	1·678			
			Def. S.	35 35·2	64	S.S.E. ½ E.	1·689	−·019		
			Mag. N.	32 02·5	64	S.S.E. ½ E.	1·675			
			Mag. N.S.	41 46·1	64	S.S.E. ½ E.	1·706			
			Mag. S.	22 29·8	64	S.S.E. ½ E.				
29.	−41 34	183 40	Def. N.	38 16·1	65	S. by E.	1·689			
			Def. S.	35 28·7	65	S. by E.	1·695			
			Mag. N.	31 55·0	65	S. by E.	1·686			
			Mag. N.S.	41 32·6	65	S. by E.	1·720			
			Mag. S.	22 14·3	65	S. by E.				
			wt. 1 gr.	13 24·0	65	S. by E.	1·660	−·023	1·666	Very steady.
			wt. 1½ gr.	20 07·1	65	S. by E.	1·678			
			wt. 2 grs.	26 39·6	65	S. by E.	1·729			
			wt. 2½ grs.	35 07·5	65	S. by E.	1·663			
			wt. 3 grs.	42 38·1	65	S. by E.	1·692			
			wt. 3½ grs.	52 14·9	65	S. by E.	1·680			
	−42 40	183 46	Def. N.	38 04·4	65	S.	1·700			
			Def. S.	35 21·7	65	S.	1·702	−·025	1·682	Very steady.
			Mag. N.	31 38·8	65	S.	1·708			
			Mag. N.S.	41 34·5	65	S.	1·717			
			Mag. S.	22 01·6	65	S.				

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Nov. 30.	−43° 33′	183° 10′	Def. N.	37° 47′0	59°	S. ½ W.	1·717			
			Def. S.	35 15·2	59	S. ½ W.	1·709			
			Mag. N.	31 33·3	59	S. ½ W.	1·716	−·024		Very steady.
			Mag. N.S.	41 28·2	59	S. ½ W.	1·727			
			Mag. S.	21 58·1	59	S. ½ W.			1·707	
	−44 15	183 02	Def. N.	37 29·0	59	S. by W.	1·734			
			Def. S.	34 31·6	59	S. by W.	1·752	−·023		A cross swell, motion slight.
			Mag. N.	31 18·9	59	S. by W.	1·737			
			Mag. N.S.	41 10·5	59	S. by W.	1·747			
			Mag. S.	21 59·4	59	S. by W.				
Dec. 1.	−45 30	183 12	Def. N.	37 08·5	63	S.E. by E.	1·753			
			Def. S.	34 49·3	63	S.E. by E.	1·735	−·007		Ship pitching considerably, steering very steadily.
			Mag. N.	31 29·9	63	S.E. by E.	1·721			
			Mag. N.S.	41 29·2	63	S.E. by E.	1·725			
			Mag. S.	21 42·2	63	S.E. by E.			1·733	
	−45 48	183 25	Def. N.	37 11·4	63	S.E. ½ E.	1·750			
			Def. S.	34 52·1	63	S.E. ½ E.	1·732	−·010		A head sea, table unsteady, ship steering well.
			Mag. N.	31 06·0	63	S.E. ½ E.	1·753			
			Mag. N.S.	40 59·4	63	S.E. ½ E.	1·762			
			Mag. S.	21 43·6	63	S.E. ½ E.				
2.	−47 13	184 30	Def. N.	37 11·8	56	S.E. by E. ½ E.	1·750			
			Def. S.	34 31·8	56	S.E. by E. ½ E.	1·752	−·002		Head sea, ship pitching, steering steadily.
			Mag. N.	31 15·8	56	S.E. by E. ½ E.	1·741			
			Mag. N.S.	41 12·7	56	S.E. by E. ½ E.	1·744			
			Mag. S.	21 07·2	56	S.E. by E. ½ E.			1·753	
	−47 39	184 55	Def. N.	36 53·8	56	S.E. by E.	1·767			
			Def. S.	34 24·0	56	S.E. by E.	1·760	−·007		
			Mag. N.	30 55·2	56	S.E. by E.	1·768			
			Mag. N.S.	40 53·0	56	S.E. by E.	1·772			
			Mag. S.	21 09·8	56	S.E. by E.				
3.	−48 18	185 54	Def. N.	36 55·9	51	S.E. by E.	1·765			
			Def. S.	34 06·7	51	S.E. by E.	1·776			
			Mag. N.	30 44·1	51	S.E. by E.	1·782			
			Mag. N.S.	40 52·8	51	S.E. by E.	1·772			
			Mag. S.	21 15·0	51	S.E. by E.				
			wt. 1 gr.	12 01·0	51	S.E. by E.	1·844	−·007	1·772	Very steady.
			wt. 1½ gr.	18 51·1	51	S.E. by E.	1·784			
			wt. 2 grs.	25 50·7	51	S.E. by E.	1·777			
			wt. 2½ grs.	32 51·6	51	S.E. by E.	1·760			
			wt. 3 grs.	40 23·1	51	S.E. by E.	1·766			
			wt. 3½ grs.	48 41·0	51	S.E. by E.	1·765			
	−49 05	186 54	Def. N.	36 51·6	51	S.E. by E. ½ E.	1·769			
			Def. S.	34 06·3	51	S.E. by E. ½ E.	1·777			
			Mag. N.	30 46·1	51	S.E. by E. ½ E.	1·780			
			Mag. N.S.	40 45·8	51	S.E. by E. ½ E.	1·781			
			Mag. S.	21 11·2	51	S.E. by E. ½ E.				
			wt. 1 gr.	12 23·7	51	S.E. by E. ½ E.	1·790	−·005	1·772	Very steady.
			wt. 1½ gr.	18 37·4	51	S.E. by E. ½ E.	1·804			
			wt. 2 grs.	25 50·1	51	S.E. by E. ½ E.	1·778			
			wt. 2½ grs.	32 30·9	51	S.E. by E. ½ E.	1·777			
			wt. 3 grs.	40 32·8	51	S.E. by E. ½ E.	1·760			
			wt. 3½ grs.	48 59·5	51	S.E. by E. ½ E.	1·757			
4.	−49 24	187 23	Def. N.	36 41·8	54	E.	1·779	+·004		
			Def. N.	36 44·7	54	E. by S.	1·776			
			Def. S.	34 22·0	54	E. by S.	1·762			
			Mag. N.	30 48·7	54	E. by S.	1·776			
			Mag. N.S.	40 56·3	54	E. by S.	1·768	−·000	1·772	Swell from the northward, steady.

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Pace east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Dec. 4.	−49 24	187 23	Mag. S.	21 25·6	54	E. by S.		·000	1·772	Swell from the northward. Steady.
			wt. 1 gr.	12 24·3	54	E. by S.	1·789			
			wt. 1½ gr.	18 55·0	54	E. by S.	1·778			
			wt. 2 grs.	25 46·4	54	E. by S.	1·782			
			wt. 2½ grs.	32 36·7	54	E. by S.	1·774			
			wt. 3 grs.	40 48·6	54	E. by S.	1·753			
			wt. 3½ grs.	48 56·7	54	E. by S.	1·759			
5.	−49 23	188 54	Def. N.	36 18·3	55	E. by S.	1·803			
			Def. S.	34 29·5	55	E. by S.	1·754			
			Mag. N.	30 46·1	55	E. by S.	1·780			
			Mag. N.S.	40 54·9	55	E. by S.	1·770			
			Mag. S.	21 34·1	55	E. by S.				
			wt. 1 gr.	12 35·7	55	E. by S.	1·762			
			wt. 1½ gr.	18 20·9	55	E. by S.	1·831			
			wt. 2 grs.	25 35·5	55	E. by S.	1·794	·000	1·775	Very steady.
			wt. 2½ grs.	32 51·2	55	E. by S.	1·762			
			wt. 3 grs.	40 31·3	55	E. by S.	1·762			
			wt. 3½ grs.	48 46·6	55	E. by S.	1·764			
	−49 38	189 44	Def. N.	36 34·4	55	E. by S.	1·787			
			Def. S.	34 28·8	55	E. by S.	1·755			
			Mag. N.	30 54·8	55	E. by S.	1·766			
			Mag. N.S.	41 01·8	55	E. by S.	1·759			
			Mag. S.	21 46·8	55	E. by S.				
6.	−49 50	190 46	Def. N.	36 37·1	51	E. by S.	1·784			
			Def. S.	34 02·5	51	E. by S.	1·781			
			Mag. N.	30 49·4	51	E. by S.	1·775			
			Mag. N.S.	41 04·2	51	E. by S.	1·756			
			Mag. S.	21 41·3	51	E. by S.				
			wt. 1 gr.	12 38·8	51	E. by S.	1·753	·000	1·766	Very steady.
			wt. 1½ gr.	18 49·6	51	E. by S.	1·785			
			wt. 2 grs.	25 40·4	51	E. by S.	1·788			
			wt. 2½ grs.	33 28·2	51	E. by S.	1·725			
			wt. 3 grs.	40 37·3	51	E. by S.	1·758			
			wt. 3½ grs.	49 09·5	51	E. by S.	1·753			
	−50 08	191 39	Def. N.	36 40·0	51	E. by S.	1·781			
			Def. S.	34 16·4	51	E. by S.	1·768			
			Mag. N.	30 51·3	51	E. by S.	1·774			
			Mag. N.S.	41 02·2	51	E. by S.	1·759	·000	1·771	Ship steady.
			Mag. S.	21 42·4	51	E. by S.				
			wt. 1 gr.	12 35·7	51	E. by S.	1·761			
			wt. 1½ gr.	18 50·0	51	E. by S.	1·785			
7.	−50 32	191 52	Def. N.	35 51·7	51	S.E. by E.	1·828			
			Def. S.	33 46·7	51	S.E. by E.	1·796			
			Mag. N.	30 48·4	51	S.E. by E.	1·778	−·007		
			Mag. N.S.	40 47·4	51	S.E. by E.	1·780			
			Mag. S.	21 27·7	51	S.E. by E.				
	−50 45	192 19	Def. N.	36 01·8	51	S.E. ½ E.	1·818			
			Def. S.	34 06·7	51	S.E. ½ E.	1·776			
			Mag. N.	30 40·7	51	S.E. ½ E.	1·785		1·777	Ship steady.
			Mag. N.S.	40 45·7	51	S.E. ½ E.	1·782			
			Mag. S.	21 32·3	51	S.E. ½ E.				
			wt. 1 gr.	12 43·0	51	S.E. ½ E.	1·743	−·008		
			wt. 1½ gr.	18 56·2	51	S.E. ½ E.	1·776			
			wt. 2 grs.	25 58·6	51	S.E. ½ E.	1·769			
			wt. 2½ grs.	32 37·7	51	S.E. ½ E.	1·772			
			wt. 3 grs.	40 35·6	51	S.E. ½ E.	1·759			
			wt. 3½ grs.	48 00·8	51	S.E. ½ E.	1·784			

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Dec. 8.	−51° 37′	194° 00′	Def. N.	35° 49·9	49°	E. by s.	1·830			
			Def. S.	33 50·1	49	E. by s.	1·793			
			Mag. N.	30 42·2	49	E. by s.	1·784			
			Mag. N.S.	40 31·4	49	E. by s.	1·796			
			Mag. S.	21 29·1	49	E. by s.				
			wt. 1 gr.	12 35·5	49	E. by s.	1·760	·000	1·794	Ship steady.
			wt. 1½ gr.	18 34·6	49	E. by s.	1·806			
			wt. 2 grs.	25 16·9	49	E. by s.	1·813			
			wt. 2½ grs.	32 08·9	49	E. by s.	1·794			
			wt. 3 grs.	40 00·3	49	E. by s.	1·780			
			wt. 3½ grs.	48 01·8	49	E. by s.	1·782			
	−52 00	195 00	Def. N.	36 01·2	49	E. by s.	1·819			
			Def. S.	33 59·6	49	E. by s.	1·783			Strong breeze, table steady, steering wildly.
			Mag. N.	30 36·5	49	E. by s.	1·792			
			Mag. N.S.	40 38·6	49	E. by s.	1·786			
			Mag. S.	20 59·5	49	E. by s.				
9.	−52 14	197 49	Def. N.	35 53·6	45	E. by s.	1·826	·000	1·799	
			Def. S.	33 44·6	45	E. by s.	1·798			
			Mag. N.	30 21·9	45	E. by s.	1·812			
			Mag. N.S.	40 47·0	45	E. by s.	1·781			Ship unsteady, steering wild.
			Mag. S.	20 38·5	45	E. by s.				
10.	−53 01	202 16	Mag. N.S.	40 36·2	45	E. by s.	1·791			
11.	−52 51	203 56	Def. N.	36 14·8	46	E. ½ N.	1·805			
			Def. S.	33 54·6	46	E. ½ N.	1·788			
			Mag. N.	30 26·7	46	E. ½ N.	1·806			
			Mag. N.S.	40 30·9	46	E. ½ N.	1·798			
			Mag. S.	21 26·5	46	E. ½ N.				
			wt. 1 gr.	11 50·3	46	E. ½ N.	1·871	+·008		Violent motion, steering well, head sea, table pretty steady.
			wt. 1½ gr.	17 43·9	46	E. ½ N.	1·891			
			wt. 2 grs.	24 29·7	46	E. ½ N.	1·867			
			wt. 2½ grs.	31 19·3	46	E. ½ N.	1·837			
			wt. 3 grs.	39 46·3	46	E. ½ N.	1·788			
			wt. 3½ grs.	47 43·1	46	E. ½ N.	1·791			
12.	−52 53	205 07	Def. N.	36 41·3	45	E.S.E.	1·780		1·820	
			Def. S.	33 40·8	45	E.S.E.	1·802			
			Mag. N.	30 30·2	45	E.S.E.	1·801			
			Mag. N.S.	40 20·2	45	E.S.E.	1·813			
			Mag. S.	21 23·0	45	E.S.E.				
			wt. 1 gr.	12 30·8	45	E.S.E.	1·771	−·003		Head swell, little motion, steering well.
			wt. 1½ gr.	18 07·9	45	E.S.E.	1·851			
			wt. 2 grs.	24 38·0	45	E.S.E.	1·857			
			wt. 2½ grs.	31 44·7	45	E.S.E.	1·815			
			wt. 3 grs.	39 30·1	45	E.S.E.	1·798			
			wt. 3½ grs.	48 07·9	45	E.S.E.	1·779			
	−53 31	206 14	Def. N.	36 09·5	45	E.S.E.	1·811			
			Def. S.	33 22·8	45	E.S.E.	1·820			
			Mag. N.	30 11·3	45	E.S.E.	1·828			
			Mag. N.S.	39 57·5	45	E.S.E.	1·841			
			Mag. S.	21 07·1	45	E.S.E.				
			wt. 1 gr.	12 08·9	45	E.S.E.	1·823	−·003	1·834	A slight motion, steering very well.
			wt. 1½ gr.	18 00·7	45	E.S.E.	1·863			
			wt. 2 grs.	24 39·1	45	E.S.E.	1·856			
			wt. 2½ grs.	31 15·2	45	E.S.E.	1·840			
			wt. 3 grs.	38 03·7	45	E.S.E.	1·855			
			wt. 3½ grs.	47 41·3	45	E.S.E.	1·834			

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Dec. 13.	−54 19	208 24	Def. N.	36 02·0	51	E.S.E.	1·818			
			Def. S.	33 17·8	51	E.S.E.	1·825			
			Mag. N.	30 23·2	51	E.S.E.	1·811			
			Mag. N.S.	40 28·8	51	E.S.E.	1·801			
			Mag. S.	20 27·6	51	E.S.E.				Table steady, steering badly.
	−54 53	209 24	Def. N.	36 03·0	51	E.S.E.	1·817	−·003		
			Def. S.	33 14·6	51	E.S.E.	1·828			
			Mag. N.	30 10·5	51	E.S.E.	1·829			
			Mag. N.S.	39 59·5	51	E.S.E.	1·837		1·814	
			Mag. S.	20 52·6	51	E.S.E.				
	−54 48	209 25	Def. N.	36 18·6	51	E.S.E.	1·802			Heavy sea, steering badly.
	−55 04	209 58	Def. N.	36 11·8	48	S.E. by S.	1·808			
			Def. S.	32 54·1	48	S.E. by S.	1·849			Ship much more steady, steering better.
			Mag. N.	30 18·1	48	S.E. by S.	1·818	−·015		
			Mag. N.S.	40 03·9	48	S.E. by S.	1·831			
			Mag. S.	20 54·4	48	S.E. by S.				
14.	−56 14	211 43	Def. N.	35 54·6	52	S.E. by S.	1·825			
			Def. S.	32 37·1	52	S.E. by S.	1·867			
			Mag. N.	29 56·6	52	S.E. by S.	1·849			
			Mag. N.S.	39 36·9	52	S.E. by S.	1·867			
			Mag. S.	20 21·6	52	S.E. by S.		−·015	1·836	Table steady, steering well.
			Def. N.	35 55·5	52	S.E. by S.	1·824			
			Def. S.	32 43·8	52	S.E. by S.	1·860			
			Mag. N.	29 59·3	52	S.E. by S.	1·845			
			Mag. N.S.	39 31·8	52	S.E. by S.	1·874			
			Mag. S.	20 24·4	52	S.E. by S.				
	−56 30	211 50	Def. N.	35 36·6	52	S.E. by S.	1·841			
			Def. S.	32 43·4	52	S.E. by S.	1·861			
			Mag. N.	29 59·9	52	S.E. by S.	1·844			
			Mag. N.S.	40 01·6	52	S.E. by S.	1·834			
			Mag. S.	20 33·4	52	S.E. by S.				
			wt. 1 gr.	11 46·1	52	S.E. by S.	1·884	−·015	1·841	Very steady.
			wt. 1½ gr.	18 10·6	52	S.E. by S.	1·848			
			wt. 2 grs.	24 02·0	52	S.E. by S.	1·902			
			wt. 2½ grs.	31 08·6	52	S.E. by S.	1·848			
			wt. 3 grs.	38 07·8	52	S.E. by S.	1·855			
			wt. 3½ grs.	46 00·9	52	S.E. by S.	1·846			
15.	−56 53	212 06	Def. N.	35 33·1	41	S.E. by S.	1·845			
			Def. S.	32 47·5	41	S.E. by S.	1·855			
			Mag. N.	29 57·1	41	S.E. by S.	1·848			
			Mag. N.S.	40 06·1	41	S.E. by S.	1·828			
			Mag. S.	20 33·2	41	S.E. by S.		−·015	1·843	Very steady.
	−57 16	212 17	Def. N.	35 28·4	41	S.E. by S.	1·850			
			Def. S.	32 21·9	41	S.E. by S.	1·882			
			Mag. N.	29 25·4	41	S.E. by S.	1·895			
			Mag. N.S.	39 39·1	41	S.E. by S.	1·865			
			Mag. S.	20 14·7	41	S.E. by S.				
16.	−57 44	212 59	Def. N.	35 13·8	42	S.S.E.	1·863			
			Def. S.	32 22·3	42	S.S.E.	1·882			
			Mag. N.	29 51·2	42	S.S.E.	1·857			
			Mag. N.S.	39 30·9	42	S.S.E.	1·876			
			Mag. S.	20 15·2	42	S.S.E.		−·019	1·863	Very steady.
			wt. 1 gr.	11 45·4	42	S.S.E.	1·882			
			wt. 1½ gr.	18 00·2	42	S.S.E.	1·860			
			wt. 2 grs.	23 38·6	42	S.S.E.	1·929			
			wt. 2½ grs.	30 04·6	42	S.S.E.	1·904			

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Dec. 16.	−58 28	213 08	Def. N.	34 42·2	42	S.S.E.	1·895			
			Def. S.	32 09·3	42	S.S.E.	1·896			
			Mag. N.	29 32·0	42	S.S.E.	1·885			
			Mag. N.S.	39 29·4	42	S.S.E.	1·878			
			Mag. S.	20 16·5	42	S.S.E.				
			wt. 1 gr.	11 33·4	42	S.S.E.	1·915			
			wt. 1½ gr.	17 36·2	42	S.S.E.	1·904			
			wt. 2 grs.	23 48·0	42	S.S.E.	1·917	−·017	1·878	Very steady.
			wt. 2½ grs.	29 50·1	42	S.S.E.	1·918			
			wt. 3 grs.	36 40·9	42	S.S.E.	1·914			
			wt. 3½ grs.	44 52·1	42	S.S.E.	1·877			
	−58 44	213 11	Def. N.	35 11·8	42	S.S.E.	1·865			
			Def. S.	32 22·7	42	S.S.E.	1·882			
			Mag. N.	29 28·0	42	S.S.E.	1·891			
			Mag. N.S.	39 16·0	42	S.S.E.	1·896			
			Mag. S.	19 46·3	42	S.S.E.				
17.	−60 48	213 51	Def. N.	34 58·7	36	S.S.E.	1·878			
			Def. S.	31 59·8	36	S.S.E.	1·905			
			Mag. N.	29 19·8	36	S.S.E.	1·903			
			Mag. N.S.	39 06·6	36	S.S.E.	1·907			
			Mag. S.	19 45·9	36	S.S.E.				
			wt. 1 gr.	11 51·7	36	S.S.E.	1·863	−·016		
			wt. 1½ gr.	16 49·6	36	S.S.E.	1·987			
			wt. 2 grs.	23 56·7	36	S.S.E.	1·907			
			wt. 2½ grs.	29 43·5	36	S.S.E.	1·923			
			wt. 3 grs.	36 48·8	36	S.S.E.	1·906		1·892	Very slight motion, steering well.
			wt. 3½ grs.	44 22·1	36	S.S.E.	1·893			
	−61 37	213 54	Def. N.	34 28·6	34	S. ½ E.	1·908			
			Def. S.	31 43·6	34	S. ½ E.	1·922			
			Mag. N.	29 09·5	34	S. ½ E.	1·918	−·016		
			Mag. N.S.	39 10·2	34	S. ½ E.	1·903			
			Mag. S.	19 54·3	34	S. ½ E.				
18.	−62 34	212 34	Def. N.	34 27·6	32	S. by E.	1·909			
			Def. S.	31 38·4	32	S. by E.	1·928			
			Mag. N.	29 06·9	32	S. by E.	1·922			
			Mag. N.S.	38 39·3	32	S. by E.	1·945			
			Mag. S.	19 21·5	32	S. by E.				
			wt. 1 gr.	11 30·6	32	S. by E.	1·920	−·016	1·916	Very steady, sailing amongst loose ice.
			wt. 1½ gr.	16 59·2	32	S. by E.	1·968			
			wt. 2 grs.	23 55·7	32	S. by E.	1·905			
			wt. 2½ grs.	29 07·6	32	S. by E.	1·958			
			wt. 3 grs.	36 00·5	32	S. by E.	1·942			
			wt. 3½ grs.	43 45·9	32	S. by E.	1·920			
19.	−63 06	210 55	Def. N.	34 27·4	40	S.S.W.	1·910			
			Def. S.	31 50·7	40	S.S.W.	1·914			
			Mag. N.	29 08·0	40	S.S.W.	1·920			
			Mag. N.S.	38 52·6	40	S.S.W.	1·927			
			Mag. S.	19 37·4	40	S.S.W.		−·015	1·910	Very steady, running amongst loose ice.
20.	−63 36	208 20	Def. N.	34 20·3	34	S.S.W.	1·917			
			Def. S.	31 19·9	34	S.S.W.	1·946			
			Mag. N.	28 59·8	34	S.S.W.	1·932			
			Mag. N.S.	38 48·0	34	S.S.W.	1·933			
			Mag. S.	19 37·0	34	S.S.W.				
	−63 53	208 32	Def. N.	34 21·3	34	S.	1·916			
			Def. S.	31 23·0	34	S.	1·943			
			Mag. N.	28 47·5	34	S.	1·950	−·014		
			Mag. N.S.	38 39·1	34	S.	1·945			
			Mag. S.	19 21·6	34	S.			1·927	Very steady, running amongst loose ice.

Observations of the Magnetic Force. (Continued.)

1841.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Dec. 21.	−64° 11′	206° 35′	Def. N.	34° 01·3	34°	S.S.W.	1·936			
			Def. S.	31 15·8	34	S.S.W.	1·950	−·013	1·927	Very steady, running amongst loose ice.
			Mag. N.	28 54·2	34	S.S.W.	1·941			
			Mag. N.S.	38 44·7	34	S.S.W.	1·937			
			Mag. S.	19 15·2	34	S.S.W.				
	−64 51	206 19	wt. 1 gr.	11 10·3	35	S. ¼ W.	1·978			
			wt. 1½ gr.	17 10·4	35	S. ¼ W.	1·948			
			wt. 2 grs.	23 07·5	35	S. ¼ W.	1·968			
			wt. 2½ grs.	29 07·7	35	S. ¼ W.	1·959	−·013	1·943	Very steady, steering amongst loose ice.
			wt. 3 grs.	35 52·4	35	S. ¼ W.	1·949			
			wt. 3½ grs.	42 59·5	35	S. ¼ W.	1·947			
			Def. N.	34 05·5	35	S. ¼ W.	1·932			
			Def. S.	31 01·8	35	S. ¼ W.	1·965			
22.	−65 19	205 08	Def. N.	34 07·6	37	S. ½ W.	1·930			
			Def. S.	31 17·5	37	S. ½ W.	1·948			
			Mag. N.	28 50·9	37	S. ½ W.	1·945			
			Mag. N.S.	38 42·3	37	S. ½ W.	1·940			
			Mag. S.	19 29·9	37	S. ½ W.		−·013	1·931	Very steady, steering amongst loose ice.
	−65 34	205 00	Def. N.	33 59·5	37	S.	1·937			
			Def. S.	31 00·9	37	S.	1·966			
			Mag. N.	28 53·2	37	S.	1·942			
			Mag. N.S.	38 37·7	37	S.	1·946			
			Mag. S.	19 25·2	37	S.				
23.	−65 47	204 19	Def. N.	34 02·2	36	N.E.	1·935			Very steady, sailing amongst loose ice.
			Def. S.	31 23·8	36	N.E.	1·942			
			Mag. N.	28 42·6	36	N.E.	1·958	+·009		
			Mag. N.S.	38 44·3	36	N.E.	1·938			
			Mag. S.	19 44·9	36	N.E.			1·950	
24.	−65 54	204 08	Def. N.	34 15·9	42	N. by W.	1·921			Fast to a piece of ice.
			Def. S.	31 21·8	42	N. by W.	1·944	+·011		
			Mag. N.	28 51·3	42	N. by W.	1·945			
			Mag. N.S.	38 45·8	42	N. by W.	1·936			
			Mag. S.	19 29·0	42	N. by W.				
27.	−66 08	203 50	Def. N.	34 07·9	30	E.S.E.	1·929	−·004		
			Def. S.	30 57·8	30	E.S.E.	1·969		1·949	Working in a hole of water.
			Mag. N.	28 46·1	30	N.W. by N.	1·953	+·010		
			Mag. N.S.	38 45·3	30	N.W. by N.	1·937			
			Mag. S.	19 24·3	30	N.W. by N.				
28.	−66 10	202 54	Def. N.	33 56·0	30	W. by N.	1·941	+·003		
1842.										
Jan. 1.	−66 36	203 29	Def. N.	34 06·6	44	N.W. ½ W.	1·931			
			Def. S.	31 17·7	44	N.W. ½ W.	1·948			
			Mag. N.	28 46·6	44	N.W. ½ W.	1·951			
			Mag. N.S.	38 35·1	44	N.W. ½ W.	1·950			
			Mag. S.	19 28·8	44	N.W. ½ W.				
			wt. 1 gr.	11 20·8	44	N.W. ½ W.	1·950	+·009	1·961	Fast to a piece of ice, Erebus fifty yards N.E. (This result is not employed in the map.)
			wt. 1½ gr.	16 59·2	44	N.W. ½ W.	1·967			
			wt. 2 grs.	22 44·6	44	N.W. ½ W.	2·001			
			wt. 2½ grs.	29 21·5	44	N.W. ½ W.	1·947			
			wt. 3 grs.	35 50·3	44	N.W. ½ W.	1·952			
			wt. 3½ grs.	43 33·7	44	N.W. ½ W.	1·922			
7.	−66 20	203 39	Def. N.	34 13·5	33	N.W.	1·924			
			Def. S.	31 20·0	33	N.W.	1·946	+·009		
			Mag. N.	29 00·1	33	N.W.	1·932			
			Mag. N.S.	38 40·2	33	N.W.	1·943			
			Mag. S.	19 29·8	33	N.W.			1·944	Working in a hole of water.

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
	° ′	° ′		° ′	°					
Jan. 8.	−66 05	204 02	Def. N.	34 13·8	35	s. by w. ½ w.	1·923		1·944	Working in a hole of water.
			Def. S.	31 22·2	35	s. by w. ½ w.	1·944	−·011		
			Mag. N.	29 05·0	35	s. by w. ½ w.	1·925			
			Mag. N.S.	38 47·0	35	s. by w. ½ w.	1·935			
			Mag. S.	19 29·8	35	s. by w. ½ w.				
			wt. 1 gr.	11 14·4	35	N.	1·965			
			wt. 1½ gr.	17 07·6	35	N.	1·951			
			wt. 2 grs.	23 02·1	35	N.	1·982	+·012		
			wt. 2½ grs.	29 01·7	35	N.	1·963			
			wt. 3 grs.	35 44·9	35	N.	1·953			
			wt. 3½ grs.	43 14·8	35	N.	1·930			
9.	−66 01	204 04	Def. N.	33 45·1	35	s.w. ½ w.	1·952			
			Def. S.	31 12·7	35	s.w.	1·954	−·007		
			Mag. N.	28 59·9	35	s.w. by w.	1·932			
			Mag. N.S.	38 37·6	35	s.w. by w.	1·946			
			Mag. S.	19 16·0	35	s.w. by w.				
10.	−65 57	203 56	Def. N.	33 53·7	30	w. by s.	1·943			
			Def. S.	30 59·0	30	w. by s.	1·968	·000		
			Mag. N.	28 46·5	30	w. by s.	1·952			
			Mag. N.S.	38 36·3	30	E.	1·948	+·001		
			Mag. S.	19 16·3	30	E.				
			wt. 1 gr.	11 28·5	30	w. by s. ½ s.	1·923			
			wt. 1½ gr.	16 59·9	30	w. by s. ½ s.	1·965			
			wt. 2 grs.	22 55·0	30	w. by s. ½ s.	1·984		1·949	Working in a hole of water.
			wt. 2½ grs.	29 09·5	30	w. by s. ½ s.	1·955	−·003		
			wt. 3 grs.	35 46·6	30	w. by s. ½ s.	1·950			
			wt. 3½ grs.	42 54·2	30	w. by s. ½ s.	1·942			
			Def. N.	33 54·5	30	s.w. by w.	1·942			
			Def. S.	31 22·4	30	s.w. by w.	1·944	−·006		
			Mag. N.	28 46·7	30	s.w. by w.	1·952			
			Mag. N.S.	38 30·3	30	s.w. by w.	1·957			
			Mag. S.	19 19·4	30	s.w. by w.				
11.	−65 56	203 31	Def. N.	33 51·4	30	s.	1·946			
			Def. S.	31 05·2	30	s.	1·962	−·012		
			Mag. N.	28 45·2	30	s.	1·953			
			Mag. N.S.	38 40·3	30	s.	1·943			
			Mag. S.	19 21·0	30	s.				
13.	−66 06	202 10	Def. N.	34 14·7	33	N. ½ E.	1·922			
			Def. S.	31 23·1	33	N. ½ E.	1·943			
			Mag. N.	28 52·6	33	N. ½ E.	1·942	+·012	1·945	Working in a hole of water.
			Mag. N.S.	38 49·4	33	N. ½ E.	1·931			
			Mag. S.	19 36·1	33	N. ½ E.				
14.	−66 08	201 46	Def. N.	34 10·3	33	N.E. by E.	1·927			
			Def. S.	31 15·2	35	N.E. by E.	1·951			
			Mag. N.	28 49·5	35	N.E. by E.	1·947	+·008		
			Mag. N.S.	38 38·4	35	N.E. by E.	1·946			
			Mag. S.	19 27·1	35	N.E. by E.				
16.	−65 47	202 08	Def. N.	33 47·6	50		1·949			
			Def. S.	31 16·1	50		1·951			
			Mag. N.	28 52·7	50		1·942			
			Mag. N.S.	38 45·7	50		1·936			
			Mag. S.	19 44·8	50	Observed on ice.				
			wt. 1 gr.	11 25·4	50		1·940	.....	1·948	
			wt. 1½ gr.	17 08·3	50		1·957			
			wt. 2 grs.	23 02·9	50		1·979			
			wt. 2½ grs.	29 16·2	50		1·955			
			wt. 3 grs.	36 17·4	50		1·935			
			wt. 3½ grs.	43 23·5	50		1·932			

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Jan. 26.	−67° 12′	203° 12′	Def. N.	33° 14·0	35°	E. by N.	1·984			
			Def. S.	31 00·0	35	E. by N.	1·967			
			Mag. N.	28 30·9	35	E. by N.	1·977	+·003		Fast to a piece of ice: Erebus N. by W. 20 fathoms*.
			Mag. N.S.	38 28·5	35	E. by N.	1·960		1·972*	
			Mag. N.S.	38 22·2	35	S.E. by S.	1·966	−·009		Fast to a piece of ice: Erebus N.E. by E.
			Mag. S.	19 15·7	35	S.E. by S.				
28.	−67 46	204 17	Def. N.	33 47·7	35	E. by N.	1·949	+·003		
			Def. S.	31 00·7	35	N.	1·966	+·012		
			Def. N.	33 47·5	35	N. by E.	1·949	+·011		
			Def. N.	33 43·8	35	N.N.E.	1·954			
			Mag. N.	28 45·1	35	N.N.E.	1·955	+·010	1·960	A swell from W.S.W., table steady.
			Mag. N.S.	38 29·8	35	N.N.E.	1·957			
			Mag. S.	19 21·1	35	N.N.E.				
			Def. N.	33 45·2	35	S. ¾ W.	1·952			
			Def. S.	30 52·2	35	S. ¾ W.	1·975			
			Mag. N.	28 39·0	35	S. ¾ W.	1·965	−·012		
			Mag. N.S.	38 22·4	35	S. ¾ W.	1·968			
			Mag. S.	19 16·9	35	S. ¾ W.				
28.	−67 46	204 17	wt. 1 gr.	10 53·5	35	N.	2·028	+·012		
			wt. 1½ gr.	16 57·2	35	N.	1·972			
			wt. 2 grs.	23 09·2	35	N. by W. ¾ W.	1·966			
			wt. 2½ grs.	29 14·4	35	N. by W. ¾ W.	1·951	+·011	1·965	Table steady.
			wt. 3 grs.	35 37·6	35	N. by W. ¾ W.	1·959			
			wt. 3½ grs.	42 53·4	35	N. by W. ¾ W.	1·944			
29.	−67 24	204 05	Def. N.	33 42·1	31	S. by W.	1·956			
			Def. S.	30 58·3	31	S. by W.	1·969	−·012		
			Mag. N.	28 49·8	31	S. by W.	1·947			
			Mag. N.S.	38 41·5	31	S. by W.	1·941			
31.	−67 12	202 24	Def. N.	33 51·2	32	S.S.W.	1·946			
			Def. S.	30 50·5	32	S.S.W.	1·976	−·011		
			Mag. N.	28 38·1	32	S.S.W.	1·966			
			Mag. N.S.	38 30·3	32	S.S.W.	1·957		1·946	
			Mag. S.	19 21·8	32	S.S.W.				Strong breeze, table steady.
			Def. N.	33 52·1	32	S.W.	1·945	−·007		
			Def. N.	33 52·3	32	S.W. by S.	1·945	−·008		
Feb. 1.	−67 12	201 34	Def. N.	34 30·6	32	W. by S.	1·906	−·001		
	−67 16		Def. N.	34 04·4	32	E.	1·933	+·001		
			Def. N.	33 56·0	32	S.S.W.	1·941			
			Def. S.	31 03·0	32	S.S.W.	1·964	−·011	1·935	Table very steady.
			Mag. N.	28 46·3	32	S.S.W.	1·951			
			Mag. N.S.	38 31·8	32	S.S.W.	1·954			
			Mag. S.	19 21·1	32	S.S.W.				
			Def. N.	34 07·1	32	N. ¾ W.	1·930	+·011		
			Def. N.	33 51·1	32	S.W.	1·946	−·007		
2.	−67 56	199 48	Def. N.	33 33·9	31	S. by W.	1·964			
			Def. S.	31 00·5	31	S. by W.	1·966	−·011		
			Mag. N.	28 51·5	31	S. by W.	1·944			
			Mag. N.S.	38 23·3	31	S. by W.	1·967			
			Mag. S.	19 15·5	31	S. by W.			1·955	Cross sea ship unsteady.
3.	−68 21	200 06	Def. N.	33 45·4	31	S.S.W.	1·952			
			Def. S.	30 51·4	31	S.S.W.	1·976	−·011		
			Mag. N.	28 22·2	31	S.S.W.	1·990			
			Mag. N.S.	38 21·2	31	S.S.W.	1·970			
			Mag. S.	19 13·8	31	S.S.W.				

* This result has not been employed in the map.

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Feb. 4.	−68 45	199 41	Def. N.	33 38·7	30	S.	1·959			
			Def. S.	30 43·2	30	S.	1·984			
			Mag. N.	28 32·2	30	S.	1·975			
			Mag. N.S.	38 15·0	30	S.	1·977	−·011		
			Mag. S.	19 15·9	30	S.				
			wt. 1 gr.	11 08·5	30	S.	1·984			
			wt. 1½ gr.	16 55·4	30	S. ½ E.	1·974	−·011		
			wt. 2 grs.	22 31·5	30	S.	2·015			
			wt. 2½ grs.	29 00·9	30	S.	1·963	−·011	1·961	Table steady.
			wt. 3 grs.	35 06·1	30	S.	1·983			
			wt. 3½ grs.	42 35·6	30	S. by E.	1·952			
			Def. N.	33 38·8	30	S. by E.	1·959	−·011		
			Def. S.	31 04·3	30	S. by E.	1·963			
	−68 49	199 26	Def. N.	33 59·1	30	N.N.W.	1·938	+·010		
5.	−68 52	198 24	Def. N.	33 46·1	32	S.W.	1·952			
			Def. S.	30 46·1	32	S.W.	1·981	−·006		
			Mag. N.	28 35·2	32	S.W.	1·970			
			Mag. N.S.	38 24·0	32	S.W.	1·965			
			Mag. S.	19 18·6	32	S.W.			1·966	Fresh breeze, table steady.
			wt. 1 gr.	11 08·8	32	S.W. ½ W.	1·984			
			wt. 1½ gr.	16 59·2	32	S.W. ½ W.	1·966			
			wt. 2 grs.	22 30·9	32	S.W. ½ W.	2·016	−·005		
			wt. 2½ grs.	28 49·9	32	S.W. ½ W.	1·974			
			wt. 3 grs.	35 33·8	32	S.W. ½ W.	1·961			
			wt. 3½ grs.	42 40·2	32	S.W. ½ W.	1·949			
6.	−69 55	192 17	Def. N.	33 46·5	34	S. by W.	1·952			A swell from the N.N.W., unsteady.
			Def. S.	30 44·6	34	S. by W.	1·982	−·010		
			Mag. N.	28 21·7	34	S. by W.	1·990			
			Mag. N.S.	38 08·0	34	S. by W.	1·987			Steering well.
			Mag. S.	18 54·1	34	S. by W.				
			Def. N.	33 44·5	34	S.	1·953	−·010	1·965	
7.	−70 05	191 03	Def. N.	33 53·9	30	S.S.W.	1·943			
			Def. S.	30 47 4	30	S.S.W.	1·980	−·009		Swell from W.N.W., steering badly, very unsteady.
			Mag. N.	28 38·8	30	S.S.W.	1·965			
			Mag. N.S.	37 43·3	30	S.S.W.	2·021			
			Mag. S.	17 52·3	30	S.S.W.				
8.	−70 08	186 39	Def. N.	33 48·7	31	S.W.	1·948			
			Def. N.	33 49·3	31	S.W. by W.	1·947			Steering wildly, unsteady.
			Def. S.	30 38·2	31	S.W. by W.	1·989	−·004		
			Mag. N.	28 30·9	31	S.W. by W.	1·977			
			Mag. N.S.	37 43·8	31	S.W. by W.	2·020			
			Mag. S.	17 38·4	31	S.W. by W.				
	−70 17	186 04	wt. 1 gr.	11 15·2	31	S.	1·961		1·976	
			wt. 1½ gr.	16 52·1	31	S.	1·979			
			wt. 2 grs.	22 37·0	31	S.	2·007			
			wt. 2½ grs.	28 35·7	31	S.	1·989			Table steady.
			wt. 3 grs.	34 59·8	31	S.	1·988			
			wt. 3½ grs.	41 52·3	31	S.	1·980	−·009		
			Def. N.	33 38·4	31	S.	1·960			
			Def. S.	30 34·2	31	S.	1·995			
			Mag. N.	28 26·8	31	S.	1·983			
			Mag. N.S.	37 33·2	31	S.	2·034			
			Mag. S.	17 17·7	31	S.				

Observations of the Magnetic Force. (Continued.

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Feb. 9.	−70° 32′	185° 38′	Def. N.	33° 37′·4	30°	s.	1·961	−·009	1·983	Head swell, very unsteady.
			Def. S.	30 50·6	30	s.	1·976			
			Mag. N.S.	37 30·0	30	s.	2·039			
			Def. N.	33 43·4	30	s.E. by s.	1·955	−·006		
			Def. S.	30 29·7	30	s. ½ E.	1·997	−·009		
			Mag. N.S.	37 29·7	30	s. ½ E.	2·039			
10.	−69 56	184 43	Def. N.	33 37·7	32	w. by s.	1·960	·000		Head swell, not steady.
			Def. S.	30 47·2	32	w. by s.	1·980			
			Mag. N.	28 34·0	32	w. by s.	1·972			
			Mag. N.S.	37 56·0	32	w. by s.	2·004			
			Mag. S.	17 58·6	32	w. by s.				
11.	−69 51	183 02	Def. N.	33 37·5	32	w.s.w.	1·960	−·001	1·988	Strong breeze, swell from the west, table not steady.
			Def. S.	30 30·3	32	w.s.w.	1·997			
			Mag. N.	28 18·6	32	w.s.w.	1·994			
			Mag. N.S.	37 44·4	32	w.s.w.	2·029			
			Mag. S.	18 08·6	32	w.s.w.				
12.	−71 03	180 56	Def. N.	33 38·3	33	s.E. by s.	1·960	−·006		Cross sea, table very unsteady.
			Def. S.	30 37·8	33	s.E. by s.	1·989			
			Mag. N.	28 18·2	33	s.E. by s.	1·995			
			Mag. N.S.	37 51·2	33	s.E. by s.	2·011			
			Mag. S.	18 05·3	33	s.E. by s.				
13.	−72 07	181 50	Def. N.	33 22·3	31	s.E. by s.	1·976	−·006	2·001	Swell from N.W., steering wildly, table unsteady.
			Def. S.	30 42·3	31	s.E. by s.	1·985			
			Mag. N.	28 04·6	31	s.E. by s.	2·017			
			Mag. N.S.	37 27·2	31	s.E. by s.	2·044			
			Mag. S.	17 43·3	31	s.E. by s.				
14.	−72 55	181 33	Def. N.	33 14·6	30	s.E. by E.	1·983	−·004		N.W. swell, ship unsteady.
			Def. S.	30 22·9	30	s.E. by E.	2·004			
			Mag. N.	28 12·1	30	s.E. by E.	2·006			
			Mag. N.S.	37 31·9	30	s.E. by E.	2·036			
			Mag. S.	17 56·7	30	s.E. by E.				
16.	−74 51	174 02	Def. N.	33 12·5	28	s.s.E.	1·986	−·006	·2008	Table steady.
			Def. S.	30 26·1	28	s.s.E.	2·001			
			Mag. N.	27 52·3	28	s.s.E.	2·036			
			Mag. N.S.	37 19·9	28	s.s.E.	2·052			
			Mag. S.	17 45·9	28	s.s.E.				
	−75 09	173 16	wt. 1 gr.	11 09·7	28	E. ½ s.	1·976	·000		N.W. swell, motion slight.
			wt. 1½ gr.	16 40·5	28	E. ½ s.	2·001			
			wt. 2 grs.	21 41·0	28	E. ½ s.	2·090			
			wt. 2½ grs.	28 13·7	28	E. ½ s.	2·013			
			wt. 3 grs.	34 53·1	28	E. ½ s.	1·995			
			wt. 3½ grs.	42 16·6	28	E. ½ s.	1·964			
			Def. N.	33 04·9	28	E. by s.	1·990	·000		
			Def. S.	30 23·8	28	E. by s.	2·003			
			Mag. N.S.	37 27·9	28	E. by s.	2·042			
17.	−76 06	174 57	Def. N.	33 25·4	32	E. by N. ½ N.	1·973	+·002	·2006	Steering wildly, table unsteady.
			Def. S.	30 37·3	32	E. by N. ½ N.	1·990			
			Mag. N.	28 16·2	32	E. by N. ½ N.	1·999			
			Mag. N.S.	37 28·6	32	E. by N. ½ N.	2·041			
			Mag. S.	17 38·4	32	E. by N. ½ N.				
18.	−77 02	181 37	Def. N.	33 12·4	27	E.N.E	1·987	+·004	2·007	Cross sea, table unsteady.
			Def. S.	30 36·1	27	E.N.E.	1·991			
			Mag. N.	28 17·4	27	E.N.E.	1·998			
			Mag. N.S.	37 31·7	27	E.N.E.	2·036			
			Mag. S.	17 49·0	27	E.N.E.				

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
	° ′	° ′		° ′	°					
Feb. 19.	−76 48	184 46	Def. N.	33 16·1	25	N. by E.	1·983			
			Def. S.	30 30·3	25	N. by E.	1·997	+·006	2·009	Head sea, ship unsteady.
			Mag. N.	28 14·8	25	N. by E.	2·002			
			Mag. N.S.	37 34·7	25	N. by E.	2·031			
			Mag. S.	17 30·6	25	N. by E.				
20.	−76 20	191 26	Def. N.	33 10·8	28	N.E.	1·988			
			Def. S.	30 30·9	28	N.E.	1·996	+·005	2·024	Head sea, ship unsteady.
			Mag. N.	27 55·8	28	N.E.	2·030			
			Mag. N.S.	37 12·8	28	N.E.	2·062			
			Mag. S.	17 14·3	28	N.E.				
22.	−76 24	184 54	Def. N.	33 09·1	30	S.E. by S.	1·990			
			Def. S.	30 25·3	30	S.E. by S.	2·002	−·005	2·004	Strong wind, head sea, unsteady.
			Mag. N.	28 11·1	30	S.E. by S.	2·007			
			Mag. N.S.	37 30·2	30	S.E. by S.	2·039			
			Mag. S.	17 41·0	30	S.E. by S.				
	−77 13	193 52	Def. N.	33 12·9	30	E. by S.	1·986			
			Def. S.	30 39·5	30	E. by S.	1·987			
			Mag. N.	28 21·0	30	E. by S.	1·991			
			Mag. N.S.	37 31·9	30	E. by S.	2·036			
			Mag. S.	17 13·0	30	E. by S.				
			wt. 1 gr.	10 55·0	30	E. by S.	2·021	·000	2·011	Light swell, motion gentle.
			wt. 1½ gr.	16 28·5	30	E. by S.	2·026			
			wt. 2 grs.	22 23·3	30	E. by S.	2·028			
			wt. 2½ grs.	28 07·5	30	E. by S.	2·020			
			wt. 3 grs.	34 16·6	30	E. by S.	2·025			
			wt. 3½ grs.	41 32·7	30	E. by S.	1·992			
23.	−77 47	197 25	Def. N.	33 28·8	29	N.E. by E.	1·969	+·005	2·001	Table steady.
			Def. S.	30 36·2	29	N.E. by E.	1·991			
			Mag. N.	28 08·2	29	E.N.E.	2·011	+·004		
			Mag. N.S.	37 45·3	29	E.N.E.	2·018			
			Mag. S.	17 17·8	29	E.N.E.				
24.	−77 14	199 29	Def. N.	33 10·3	30	S.W. by S.	1·989			
			Def. S.	30 41·2	30	S.W. by S.	1·980			
			Mag. N.	28 22·9	30	S.W. by S.	1·989			
			Mag. N.S.	37 30·5	30	S.W. by S.	2·038			
			Mag. S.	17 25·3	30	S.W. by S.				
			wt. 1 gr.	11 02·2	30	S.W. by S.	2·000	−·005	1·992	Fresh breeze, swell from N.E., table steady.
			wt. 1½ gr.	16 31·1	30	S.W. by S.	2·020			
			wt. 2 grs.	22 33·5	30	S.W. by S.	2·010			
			wt. 2½ grs.	28 40·4	30	S.W. by S.	1·983			
			wt. 3 grs.	34 58·0	30	S.W. by S.	1·989			
			wt. 3½ grs.	42 08·1	30	S.W. by S.	1·970			
25.	−75 20	194 36	Def. N.	33 05·2	29	W.	1·994			
			Def. S.	30 34·4	29	W.	1·993			
			Mag. N.	28 14·8	29	W.	2·000	+·001	2·003	Fresh breeze, swell from N.E., table steady.
			Mag. N.S.	37 43·8	29	W.	2·020			
			Mag. S.	17 38·2	29	W.				
26.	−73 10	189 21	Def. N.	33 17·7	29	N.W. by W.	1·980			
			Def. S.	30 34·9	29	N.W. by W.	1·992	+·005	2·000	Strong breeze, motion great.
			Mag. N.	28 06·6	29	N.W. by W.	2·012			
			Mag. N.S.	38 01·7	29	N.W. by W.	1·995			
			Mag. S.	17 13·8	29	N.W. by W.				
27.	−72 03	187 40	Def. N.	33 22·8	26	S.W.	1·976			
			Def. S.	30 36·3	26	S.W.	1·991	−·005		
			Mag. N.	28 11·4	26	S.W.	2·007			
			Mag. N.S.	37 39·4	26	W. by N. ½ N.	2·025	+·002		
			Mag. S.	17 28·8	26	W. by N. ½ N.			1·999	Easterly swell, slight motion.

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Feb. 27.	−72° 03′	187° 40′	wt. 1 gr.	11° 01′·0	26°	s.w. ¼ w.	2·002		1·999	Easterly swell, slight motion.
			wt. 1½ gr.	16 26·3	26	s.w. ¼ w.	2·029			
			wt. 2 grs.	22 13·8	26	s.w. ¼ w.	2·040			
			wt. 2½ grs.	28 25·7	26	s.w. ¼ w.	1·998	−·005		
			wt. 3 grs.	34 35·3	26	s.w. ¼ w.	2·009			
			wt. 3½ grs.	42 33·7	26	s.w. ¼ w.	1·953			
	−71 43	187 15	wt. 1 gr.	11 04·8	26	w. by n. ½ n.	1·990			
			wt. 1½ gr.	16 01·3	26	w. by n. ½ n.	2·081			
			wt. 2 grs.	22 29·5	26	w. by n. ½ n.	2·016			
			wt. 2½ grs.	28 37·6	26	w. by n. ½ n.	1·986	+·002		
			wt. 3 grs.	34 56·6	26	w. by n. ½ n.	1·990			
			wt. 3½ grs.	42 04·9	26	w. by n. ½ n.	1·971		1·999	Easterly swell, slight motion.
28.	−71 20	184 30	Def. N.	33 44·8	25	w. by s.	1·952			
			Def. S.	30 47·1	25	w. by s.	1·980			
			Mag. N.	28 22·8	25	w. by s.	1·988	·000		
			Mag. N.S.	37 39·1	25	w. by s.	2·025			
			Mag. S.	17 44·3	25	w. by s.				
Mar. 1.	−69 54	179 55	Def. N.	33 24·5	32	w.n.w.	1·974			
			Def. S.	30 38·5	32	w.n.w.	1·989	+·005	1·999	Easterly swell, slight motion.
			Mag. N.	28 17·3	32	w.n.w.	1·998			
			Mag. N.S.	37 47·1	32	w.n.w.	2·015			
			Mag. S.	17 43·2	32	w.n.w.				
2.	−68 09	183 10	Def. N.	33 34·6	32	n.n.e.	1·963			
			Def. S.	31 01·2	32	n.n.e.	1·966	+·007	1·981	Swell from eastward.
			Mag. N.	28 30·9	32	n.n.e.	1·977			
			Mag. N.S.	38 05·3	32	n.n.e.	1·990			
			Mag. S.	18 05·9	32	n.n.e.				
3.	−67 35	185 18	Def. N.	33 30·0	31	n.e. by e.	1·968			
			Def. S.	31 15·6	31	n.e. by e.	1·951			
			Mag. N.	28 29·3	31	n.e. by e.	1·979	+·006		
			Mag. N.S.	37 54·8	31	n.e. by e.	2·005			
			Mag. S.	18 00·1	31	n.e. by e.				
			wt. 1 gr.	11 07·4	31	n.e. by e.	1·986		1·978	Cross sea, ship unsteady.
			wt. 1½ gr.	17 00·0	31	n.e. ½ e.	1·965			
			wt. 2 grs.	22 48·2	31	n.e. ½ e.	1·993			
			wt. 2½ grs.	28 54·6	31	n.e. ½ e.	1·970	+·006		
			wt. 3 grs.	35 30·5	31	n.e. ½ e.	1·965			
			wt. 3½ grs.	42 54·1	31	n.e. ½ e.	1·942			
4.	−67 40	187 40	Def. N.	33 43·9	33	n. by w.	1·954			
			Def. S.	31 04·0	33	n. by w.	1·963	+·011		
			Mag. N.	28 23·5	33	n. by w.	1·988			
			Mag. N.S.	37 47·2	33	n. by w.	2·015			
			Mag. S.	17 59·9	33	n. by w.			1·981	Strong gale, heavy sea, ship unsteady.
5.	−67 09	188 02	Def. N.	33 43·6	35	n.	1·954			
			Def. S.	31 47·7	35	n.	1·917	+·012		
			Mag. N.	28 36·4	35	n.	1·968			
			Mag. N.S.	37 57·1	35	n.	2·003			
			Mag. S.	17 50·3	35	n.				
6.	−65 28	191 24	Def. N.	33 56·8	33	n. by e.	1·940			Heavy sea from W.S.W., ship very unsteady.
			Def. S.	31 20·9	33	n. by e.	1·945	+·012		
			Mag. N.	28 44·3	33	n. by e.	1·956			
			Mag. N.S.	38 07·4	33	n. by e.	1·988			
			Mag. S.	18 29·3	33	n. by e.				
	−64 49	192 21	wt. 1 gr.	11 29·7	33	n. by e. ½ e.	1·920			Swell from the S.S.W., table steady.
			wt. 1½ gr.	17 20·6	33	n. by e. ½ e.	1·928			
			wt. 2 grs.	23 10·9	33	n. by e. ½ e.	1·963	+·012	1·955	

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
	° ′	° ′		° ′	°					
Mar. 6.	−64 49	192 21	wt. 2½ grs.	29 34·9	33	N. by E. ½ E.	1·930	+·012	1·955	Swell from the S.S.W., table steady.
			wt. 3 grs.	36 02·8	33	N. by E. ½ E.	1·940			
			wt. 3½ grs.	43 37·5	33	N. by E. ½ E.	1·917			
7.	−63 30	194 15	Def. N.	34 42·3	33	N. by E.	1·895			
			Def. S.	31 50·8	33	N. by E.	1·914	+·012	1·942	Table steady.
			Mag. N.	29 04·3	33	N. by E.	1·926			
			Mag. N.S.	38 11·2	33	N. by E.	1·983			
			Mag. S.	18 24·5	33	N. by E.				
8.	−62 17	195 55	Def. N.	34 47·8	35	N. by E.	1·889			
			Def. S.	32 05·4	35	N. by E.	1·900			
			Mag. N.	29 00·5	35	N. by E.	1·931			
			Mag. N.S.	38 35·2	35	N. by E.	1·950			
			Mag. S.	18 46·6	35	N. by E.				
			wt. 1 gr.	11 47·0	35	N. by E.	1·875	+·014		Table steady.
			wt. 1½ gr.	18 01·9	35	N. by E.	1·857			
			wt. 2 grs.	23 47·3	35	N. by E.	1·916			
			wt. 2½ grs.	30 03·9	35	N. by E.	1·902			
			wt. 3 grs.	37 04·3	35	N. by E.	1·894		1·916	
			wt. 3½ grs.	45 00·2	35	N. by E.	1·870			
9.	−61 06	198 08	Def. N.	34 50·2	35	N.E. ½ N.	1·887			
			Def. S.	32 03·8	35	N.E. ½ N.	1·901	+·013		
			Mag. N.	29 15·0	35	N.E. ½ N.	1·910			Sea getting up, unsteady.
			Mag. N.S.	38 35·4	35	N.E. ½ N.	1·950			
			Mag. S.	18 55·7	35	N.E. ½ N.				
10.	−60 19	203 42	Def. N.	34 45·6	34	E.N.E.	1·891			
			Def. S.	32 05·7	34	E.N.E.	1·899	+·010	1·920	Ship unsteady.
			Mag. N.	29 15·1	34	E.N.E.	1·910			
			Mag. N.S.	38 40·9	34	E.N.E.	1·942			
			Mag. S.	19 00·8	34	E.N.E.				
11.	−60 15	208 06	Def. N.	35 04·8	35	E. by N.	1·872			
			Def. S.	31 58·7	35	E. by N.	1·906			Strong gale, heavy sea, ship very unsteady.
			Mag. N.	29 04·3	35	E. by N.	1·926			
			Mag. N.S.	38 46·5	35	E. by N.	1·935			
			Mag. S.	18 53·1	35	E. by N.		+·007	1·907	
12.	60 16	211 45	Def. N.	35 04·2	35	E. by N.	1·873			
			Def. S.	32 08·0	35	E. by N.	1·897			Heavy swell from S.W., unsteady.
			Mag. N.	29 25·5	35	E. by N.	1·894			
			Mag. N.S.	39 14·9	35	E. by N.	1·897			
			Mag. S.	18 53·3	35	E. by N.				
13.	−59 53	216 28	Def. N.	35 00·2	36	N.E. ½ E.	1·877			
			Def. S.	32 11·9	36	N.E. ½ E.	1·893	+·015	1·910	Heavy swell, steering badly.
			Mag. N.	29 23·2	36	N.E. ½ E.	1·898			
			Mag. N.S.	39 02·3	36	N.E. ½ E.	1·914			
			Mag. S.	18 59·1	36	N.E. ½ E.				
14.	−59 22	218 14	Def. N.	35 07·5	37	N.E. ½ E.	1·870			
			Def. S.	32 32·6	37	N.E. ½ E.	1·871	+·015	1·900	Heavy swell, very unsteady, steering badly.
			Mag. N.	29 36·2	37	N.E. ½ E.	1·879			
			Mag. N.S.	38 56·5	37	N.E. ½ E.	1·922			
			Mag. S.	19 00·9	37	N.E. ½ E.				
15.	−58 49	221 25	Def. N.	35 14·8	37	E.N.E.	1·862			
			Def. S.	31 38·8	37	E.N.E.	1·927	+·011	1·913	Heavy swell, steering badly.
			Mag. N.	29 10·9	37	E.N.E.	1·917			
			Mag. N.S.	39 11·3	37	E.N.E.	1·902			
			Mag. S.	19 05·6	37	E.N.E.				

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Mar. 16.	−59 01	227 43	Def. N.	34 39·9	39	E.	1·897			
			Def. S.	32 14·2	39	E.	1·891			
			Mag. N.	29 30·9	39	E.	1·887	+·003	1·897	Heavy swell, steering badly.
			Mag. N.S.	39 10·7	39	E.	1·903			
			Mag. S.	18 51·8	39	E.				
18.	−60 05	235 56	Def. N.	35 07·2	38	E. by s.	1·870			
			Def. S.	32 36·0	38	E. by s.	1·868			
			Mag. N.	29 27·6	38	E. by s.	1·892	·000	1·884	Heavy sea from S.W. by W., ship unsteady.
			Mag. N.S.	39 08·7	38	E. by s.	1·904			
			Mag. S.	18 50·6	38	E. by s.				
	−60 17	236 38	Def. N.	35 02·5	38	E.	1·875			
			Def. S.	32 29·4	38	E.	1·875			
			Mag. N.	29 25·4	38	E.	1·896	+·003	1·892	The ship more steady.
			Mag. N.S.	39 04·2	38	E.	1·911			
			Mag. S.	18 45·3	38	E.				
	−60 24	237 29	Def. N.	35 05·5	38	E. by N.	1·872			
			Def. S.	32 07·2	38	E. by N.	1·898			
			Mag. N.	29 06·3	38	E. by N.	1·923	+·007	1·907	Ship steady.
			Mag. N.S.	39 05·9	38	E. by N.	1·909			
			Mag. S.	18 23·6	38	E. by N.				
21.	−59 05	247 27	Def. N.	35 50·2	38	E. by N.	1·830			
			Def. S.	32 49·7	38	E. by N.	1·853			
			Mag. N.	29 27·6	38	E. by N.	1·892	+·007	1·875	Cross sea, motion gentle.
			Mag. N.S.	39 13·5	38	E. by N.	1·898			
			Mag. S.	19 10·0	38	E. by N.				
22.	−58 26	251 42	Def. N.	35 29·5	38	E. by N.	1·848			
			Def. S.	32 41·7	38	E. by N.	1·862			
			Mag. N.	29 27·9	38	E. by N.	1·891	+·007	1·885	Cross sea, ship unsteady.
			Mag. N.S.	39 05·7	38	E. by N.	1·909			
			Mag. S.	19 23·5	38	E. by N.				
23.	−58 33	254 45	wt. 1 gr.	12 12·4	33	E. ½ N.	1·812			
			wt. 1½ gr.	18 20·0	33	E. ½ N.	1·828			
			wt. 2 grs.	25 22·7	33	E. ½ N.	1·803			
			wt. 2½ grs.	31 29·0	33	E. ½ N.	1·825			
			wt. 3 grs.	39 04·8	33	E. ½ N.	1·812			
			wt. 3½ grs.	47 40·6	33	E. ½ N.	1·780	+·006	1·824	Little motion.
			Def. N.	36 13·8	33	E. ½ N.	1·806			
			Def. S.	33 24·9	33	E. ½ N.	1·818			
			Mag. N.	29 55·5	33	E. ½ N.	1·850			
			Mag. N.S.	39 49·9	33	E. ½ N.	1·851			
			Mag. S.	19 52·7	33	E. ½ N.				
24.	−58 40	257 32	Def. N.	36 09·9	35	E. by N.	1·810			
			Def. S.	33 27·9	35	E. by N.	1·815			
			Mag. N.	29 47·9	35	E. by N.	1·862			Little motion.
			Mag. N.S.	39 36·0	35	E. by N.	1·869			
			Mag. S.	19 56·5	35	E. by N.		+·010	1·832	
	−58 53	258 55	wt. 1 gr.	12 30·1	35	E. by N.	1·770			
			wt. 1½ gr.	18 17·1	35	E. by N.	1·837			Little motion; overcast and damp.
			wt. 2 grs.	25 22·4	35	E. by N.	1·803			
			wt. 2½ grs.	31 46·5	35	E. by N.	1·810			
26.	−58 59	267 50	Def. N.	36 48·2	45	E. by N. ½ N.	1·773			
			Def. S.	34 31·2	45	E. by N. ½ N.	1·753			
			Mag. N.	30 53·2	45	E. by N. ½ N.	1·771	+·012	1·783	Motion gentle.
			Mag. N.S.	40 39·9	45	E. by N. ½ N.	1·786			
			Mag. S.	20 37·6	45	E. by N. ½ N.				

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Mar. 27.	−59° 01′	272° 06′	Def. N.	37° 29′·4	36°	E.N.E.	1·734			
			Def. S.	35 37·2	36	E.N.E.	1·687			
			Mag. N.	31 21·2	36	E.N.E.	1·734	+·013	1·747	Ship unsteady.
			Mag. N.S.	40 47·4	36	E.N.E.	1·780			
			Mag. S.	20 48·3	36	E.N.E.				
28.	−58 24	276 18	Def. N.	38 14·0	39	N.E. by E.	1·690			
			Def. S.	35 38·0	39	N.E. by E.	1·686			
			Mag. N.	31 57·2	39	N.E. by E.	1·684	+·016	1·722	Swell from S.W., slight motion.
			Mag. N.S.	40 59·0	39	N.E. by E.	1·763			
			Mag. S.	20 51·8	39	N.E. by E.				
29.	−58 25	279 44	wt. 1 gr.	13 14·6	45	N.E. by E.	1·676			
			wt. 1½ gr.	20 00·5	45	N.E. by E.	1·684			Slight motion.
			wt. 2 grs.	28 08·5	45	N.E. by E.	1·642			
			wt. 2½ grs.	36 37·1	45	N.E. by E.	1·601			Needle very unsteady (omitted in the mean).
			Def. N.	38 49·8	45	N.E. by E.	1·656	+·017		
			Def. S.	36 09·1	45	N.E. by E.	1·658			
			Mag. N.	32 21·1	45	N.E. by E.	1·651			
			Mag. N.S.	41 45·0	45	N.E. by E.	1·705		1·672	Slight motion.
			Mag. S.	21 53·0	45	N.E. by E.				
30.	−58 31	281 33	Def. N.	38 25·5	40	E.N.E.	1·680			
			Def. S.	36 04·1	40	E.N.E.	1·661	+·015		
			Mag. N.	32 15·8	40	E.N.E.	1·658			
			Mag. N.S.	41 37·5	40	E.N.E.	1·714			
			Mag. S.	21 26·3	40	E.N.E.				
31.	−58 36	285 33	Def. N.	39 35·3	44	N.E.	1·611			
			Def. S.	36 46·6	44	N.E.	1·619			
			Mag. N.	32 48·3	44	N.E.	1·613	+·021	1·648	Slight motion.
			Mag. N.S.	42 15·6	44	N.E.	1·664			
			Mag. S.	22 13·4	44	N.E.				
Apr. 1.	−57 21	289 36	Def. N.	40 12·8	47	N.E. by N.	1·573			
			Def. S.	36 33·8	47	N.E. by N.	1·632			Strong breeze, ship unsteady, steering wild.
			Mag. N.	33 28·9	47	N.E. by N.	1·554	+·024		
			Mag. N.S.	42 50·4	47	N.E. by N.	1·622			
			Mag. S.	22 29·8	47	N.E. by N.			1·592	
2.	−57 26	291 32	Def. N.	40 13·1	44	S.E.	1·573			Heavy sea, ship unsteady.
			Def. S.	37 44·6	44	S.E.	1·561	−·017		
			Mag. N.	33 23·9	44	S.E.	1·562			
			Mag. N.S.	42 47·3	44	S.E.	1·627			
			Mag. S.	23 07·7	44	S.E.				
3.	−56 37	294 34	Def. N.	41 28·4	44	N.E.	1·505			
			Def. S.	38 40·8	44	N.E.	1·506			
			Mag. N.	33 47·9	44	N.E.	1·527			
			Mag. N.S.	44 02·5	44	N.E.	1·523			
			Mag. S.	24 06·6	44	N.E.		+·022	1·495	Heavy sea, ship unsteady.
4.	−54 48	297 21	Def. N.	42 33·1	44	N.E.	1·443			
			Def. S.	40 06·6	44	N.E.	1·428			
			Mag. N.	35 00·8	44	N.E.	1·420			
			Mag. N.S.	45 01·4	44	N.E.	1·440			
			Mag. S.	25 06·5	44	N.E.				
5.	−52 40	299 52	Def. N.	44 47·8	44	N.N.E.	1·325			
			Def. S.	42 29·0	44	N.N.E.	1·307			
			Mag. N.	36 03·2	44	N.N.E.	1·326			
			Mag. N.S.	46 17·6	44	N.N.E.	1·326			
			Mag. S.	25 40·2	44	N.N.E.				
			wt. 1 gr.	17 23·4	44	N.N.E.	1·284			
			wt. 1½ gr.	26 11·2	44	N.N.E.	1·304	+·025	1·355	Ship steady.

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
Apr. 5.	−52° 40′	299° 52′	wt. 2 grs.	34° 54′·7	44°	N.N.E.	1·351	+·025	1·355	Ship steady.
			wt. 2½ grs.	45 13·0	44	N.N.E.	1·344			
			wt. 3 grs.	54 16·9	44	N.N.E.	1·408			
	−52 28	301 42	Def. N.	44 40·6	44	N.N.E.	1·327			
			Def. S.	42 04·5	44	N.N.E.	1·326			
			Mag. N.	36 12·5	44	N.N.E.	1·313	+·025		Ship steady.
			Mag. N.S.	46 43·3	44	N.N.E.	1·290			
			Mag. S.	25 58·0	44	N.N.E.			1·340	
6.	−51 42	301 36	Def. N.	44 52·9	44	N.N.W. ½ W.	1·319			
			Def. S.	42 26·1	44	N.N.W. ½ W.	1·308			
			Mag. N.	36 14·5	44	N.N.W. ½ W.	1·309	+·024		Slight motion.
			Mag. N.S.	46 16·5	44	N.N.W. ½ W.	1·332			
			Mag. S.	26 08·0	44	N.N.W. ½ W.				
9.	Falkland Islands.		Def. N.	44 21·2	44	W. ½ N.	1·346	+·009	1·346	Single anchor in Port Louis, Berkeley Sound.
			Def. S.	42 02·4	44	W. ½ N.	1·328			
10.			Def. N.	44 58·5	43		1·314			
	−51 32	301 53	Def. S.	41 52·8	43		1·335			
			Mag. N.	35 57·0	43		1·336			
			Mag. N.S.	46 13·9	43		1·335			
			Mag. S.	25 37·0*	43					
			wt. 1 gr.	16 56·5	43		1·316			
			wt. 1½ gr.	25 36·6	43		1·331			
			wt. 2 grs.	34 47·2	43		1·356			
			wt. 2½ grs.	45 34·1	43		1·336			
July 25.			wt. 3 grs.	57 39·1	43		1·353			
			Def. N.	44 27·0	43		1·340			
			Def. S.	42 00·4	43	Observed	1·330			
			Mag. N.	36 00·0	43	on shore.	1·331			
			Mag. N.S.	46 13·2	43		1·336			
			Mag. S.	25 42·8	43					
			wt. 1 gr.	16 51·2	43		1·323			
			wt. 1½ gr.	25 34·3	43		1·333			
			wt. 2 grs.	34 47·8	43		1·355			
			wt. 2½ grs.	45 29·7	43		1·338			
			wt. 3 grs.	57 48·7†	43		1·350			
Aug. 15.			Def. N.	44 29·0	38		1·339			
			Def. S.	41 58·0	38		1·332			
			Mag. N.	36 00·9	38		1·330			
			Mag. N.S.	46 14·8	38		1·333			At the Magnetic Station.

Mean of all the results obtained with weights at Port Louis 1·336.

* Observed on shore; face west.

	Intensity.
wt. 1 gr. 16° 14′·1	1·316
wt. 1½ gr. 24 36·9	1·338
wt. 2 grs. 33 44·9	1·342
wt. 2½ grs. 44 31·3	1·334
wt. 3 grs. 58 17·8	1·333

† Observed on shore; face west.

wt. 1 gr. 16 26·1	1·301
wt. 1½ gr. 24 27·9	1·345
wt. 2 grs. 33 49·5	1·339
wt. 2½ grs. 44 17·1	1·339
wt. 3 grs. 58 19·5	1·333

Observations of the Magnetic Force. (Continued.)

1842.	Lat.	Long.	Method employed.	Angle of deflection. Face east.	Temperature.	Ship's head.	Intensity.	Correction for ship's attraction.	Corrected Intensity.	Remarks.
	° ′	° ′		° ′ ″	°					
Aug. 15.			Mag. S.	25 52·1*	38	Observed on shore.			Mean of all the results obtained with weights at Port Louis 1·336.	At the Magnetic Station.
			wt. 1 gr.	17 00·4	38		1·311			
			wt. 1½ gr.	25 37·3	38		1·331			
			wt. 2 grs.	34 24·4	38		1·369			
			wt. 2½ grs.	45 20·1	38		1·341			
			wt. 3 grs.	57 43·6	38		1·352			
18.			Def. N.	44 27·0	38		1·340			
			Def. S.	41 59·6	38		1·330			
			Mag. N.	35 59·3	38		1·332			
			Mag. N.S.	46 12·2	38		1·338			
			Mag. S.	25 43·8	38					
Aug. 15.	At anchor in Berkeley Sound.	To obtain corrections for the ship's attraction.	Def. N.	44 59·4	40	E. ½ S.	1·313	+·007	1·320	
			Def. N.	44 32·3	40	E.	1·336	+·009	1·345	
			Def. N.	44 10·0	40	E.S.E.	1·355	−·003	1·352	
			Def. N.	43 52·8	40	S.E.	1·370	−·014	1·356	
			Def. N.	43 55·3	40	S.S.E.	1·368	−·023	1·345	
			Def. N.	43 52·3	40	S.	1·370	−·024	1·346	
			Def. N.	43 57·8	40	S.S.W.	1·366	−·023	1·343	
			Def. N.	44 05·9	40	S.W.	1·359	−·014	1·345	
			Def. N.	44 22·3	40	W.S.W.	1·345	−·003	1·342	1·342
			Def. N.	44 47·5	40	W.	1·324	+·009	1·333	
			Def. N.	45 06·1	40	W.N.W.	1·308	+·017	1·325	
			Def. N.	45 01·7	40	N.W.	1·312	+·023	1·335	
			Def. N.	44 59·7	40	N.N.W.	1·313	+·025	1·338	
			Def. N.	44 52·2	40	N.	1·320	+·026	1·346	
			Def. N.	44 57·2	40	N.N.E.	1·315	+·025	1·340	
			Def. N.	44 59·0	40	N.E.	1·314	+·023	1·337	
			Def. N.	44 32·5	40	E.N.E.	1·336	+·017	1·353	

* Observed on shore; face west.

	° ′ ″	Intensity.
wt. 1 gr.	16 15·4	1·315
wt. 1½ gr.	24 30·1	1·344
wt. 2 grs.	33 57·8	1·335
wt. 2½ grs.	44 32·3	1·333
wt. 3 grs.	57 35·7	1·344

VIII. *On a General Method in Analysis.* *By* GEORGE BOOLE, *Esq.* *Communicated by* S. HUNTER CHRISTIE, *Esq.*, *Sec. R.S. &c.*

Received January 12th,—Read January 18th.

MUCH attention has of late been paid to a method in analysis known as the calculus of operations, or as the method of the separation of symbols. Mr. GREGORY, in his Examples of the Differential and Integral Calculus, and in various papers published in the Cambridge Mathematical Journal, vols. i. and ii., has both clearly stated the principles on which the method is founded, and shown its utility by many ingenious and valuable applications. The names of M. SERVOIS (Annales des Mathématiques, vol. v. p. 93), Mr. R. MURPHY (Philosophical Transactions for 1837), Professor DE MORGAN, &c., should also be noticed in connection with the history of this branch of analysis. As I shall assume for granted the principles of the method, and shall have occasion to refer to various theorems established by their aid, it may be proper to make some general remarks on the subject by way of introduction.

Mr. GREGORY lays down the fundamental principle of the method in these words: "There are a number of theorems in ordinary algebra, which, though apparently proved to be true only for symbols representing numbers, admit of a much more extended application. Such theorems depend only on the laws of combination to which the symbols are subject, and are therefore true for all symbols, whatever their nature may be, which are subject to the same laws of combination." The laws of combination which have hitherto been recognised are the following, π and ϱ being symbols of operation, u and v subjects.

1. The commutative law, whose expression is

$$\pi\varrho u = \varrho\pi u.$$

2. The distributive law,

$$\pi(u+v) = \pi u + \pi v.$$

3. The index law,

$$\pi^m \pi^n u = \pi^{m+n} u.$$

Perhaps it might be worth while to consider whether the third law does not rather express a necessity of notation, arising from the use of general indices, than any property of the symbol π.

The above laws are obviously satisfied when π and ϱ are symbols of quantity. They are also satisfied when π and ϱ represent such symbols as $\frac{d}{dx}$, Δ, &c., in combination with each other, or with *constant* quantities. Thus,

$$\frac{d}{dx}(au)=a\frac{du}{dx},$$

$$\frac{d}{dx}(u+v)=\frac{du}{dx}+\frac{dv}{dx}.$$

These properties of the symbol $\frac{d}{dx}$, taken in connection with the principle above enunciated, lead to the most important results that have been yet established by the calculus of operations. We have an early example of their application in the symbolical form of TAYLOR's theorem, viz.

$$f(x+h)=e^{h\frac{d}{dx}}f(x).$$

A result to which we shall often refer is the following. If we have a linear equation with constant coefficients of the form

$$\pi^n u+A_1\pi^{n-1}u+A_2\pi^{n-2}u\ldots+A_n u=X,$$

wherein π operates solely on u, and is therefore *commutative* with respect to A_1, A_2, &c., then

$$u=\{\pi^n+A_1\pi^{n-1}+A_2\pi^{n-2}\ldots+A_n\}^{-1}X$$
$$=N_1(\pi-a_1)^{-1}X+N_2(\pi-a_2)^{-1}X+\&c.,$$

N_1, $N_2\ldots a_1$, $a_2\ldots$ having the same values as in the resolution of the rational fraction $\frac{1}{\xi^n+A_1\xi^{n-1}\ldots+A_n}$ into a similar series of terms*.

It is obvious that the above method is of necessity limited in its application. It is only in linear equations with *constant* coefficients that the operative symbols combine in subjection to the law we have supposed. Accordingly it has been remarked, that the calculus of operations has tended rather to simplify the processes of analysis than to extend its power.

The object of this paper is to develope a method in analysis, which, while it operates with symbols apart from their subjects, and may thus be considered as a branch of the calculus of operations, is nevertheless free from the restrictions to which we have alluded. The linear equation with variable coefficients, whether in differentials or in finite differences, will be treated under the form

$$f_0(\pi)u+f_1(\pi)\varrho u+f_2(\pi)\varrho^2 u+\&c.=U,$$

U being a function of the independent variable x, and π and ϱ operative symbols, which combine in subjection to the law

$$f(\pi)\varrho^m u=\varrho^m f(\pi+m)u,$$

and which, when the subject function u is unity, further satisfy the relation

$$f(\pi)\varrho^m=f(m)\varrho^m.$$

It might be expected, *à priori*, that a theory of linear equations founded on such a

* Cambridge Mathematical Journal, vol. ii. p. 114, vol. iii. p. 239.

basis, would be of peculiar character. Its actual advantages I conceive to be the following:—

1. The necessary reductions, transformations and developments are effected, for the most part, by theorems, the expression of which is independent of the forms of $f_0(\pi)$, $f_1(\pi)$, &c.

2. We are thus able to establish a perfectly general method for the solution of linear differential equations total and partial in series, and for the calculus of generating functions.

3. The form of the analysis affords facilities, which are believed to be peculiar to itself, for the finite integration of linear equations, and for the classification of integrable forms.

The received theory of the solution of linear differential equations in series is given by EULER*. It consists in assuming $u=\Sigma a_m t^m$, and determining by substitution the relation connecting the successive values of a_m, or as it is called, the scale of the equation. This method fails when, in seeking the first index of a development, we arrive at equal or imaginary values. I am not aware that any mathematician has shown how this failure is to be remedied. Now the method developed in this paper has no such cases of exception.

The theory of series and of generating functions has been successively discussed by EULER and LAPLACE. A full account of their researches is given in LACROIX's larger treatise on the Calculus, tom. iii., in the chapters *Théorie des Suites* and *Théorie des Fonctions Génératrices*. I class these investigations together, because, although their objects are distinct, their mathematical theories are virtually the same. EULER proposes to determine the generating function of a series, $\Sigma u_m t^m$, when the coefficients are formed according to such a law as the following:

$$u_m=\frac{(am+b)(a_1m+b_1)\dots}{(cm+e)(c_1m+e_1)\dots}u_{m-1}.$$

He shows that by successive differentiations and integrations, the factors $am+b$, $cm+e\dots$ may be eliminated, and the problem finally reduced to the solution of a differential equation. LAPLACE†, considering the unknown quantity u_x in an equation of differences as the general coefficient of the expansion of a function u, proposes to determine u, and then by expansion to obtain u_x. It is not necessary for us to consider here whether the theory of generating functions is of any importance to the solution of equations of differences. The discovery of the generating function of a series is in itself a problem both interesting and important. Those who have paid attention to the subject will, I think, admit that the theories by which EULER and LAPLACE have endeavoured to accomplish this object, labour under two defects, one arising from the tedious character of the process by which the differential equation is formed, the other from the difficulty of its integration. This does by no means derogate from the genius or the claims of those wonderful men;

* Calc. Integ. vol. ii. † Théorie des Probabilités.

for the value of every discovery is in some measure relative, and is to be measured by the state of contemporary science as well as by its abstract merit.

The advantages which the method of this paper is believed to possess as respects the theory of series, are the following:—

1. The law of the series being known, or the equation of differences given, the differential equation is known by inspection. The rule is absolutely general, whatever may be the forms of the coefficients.

2. The form under which the differential equation is presented offers great facilities for its integration. Those facilities are chiefly owing to the circumstance, that the form of the equation permits us, as before remarked, to effect the requisite transformations by general theorems. That this form has a peculiar fitness for the processes of integration, is further shown by the circumstance, that the method of resolution which in the common theory leads to the solution of differential equations with constant coefficients, conducts us here to the solution of a large class of equations with variable coefficients.

The arrangement of the subjects treated in this paper will lead us to consider,—1st, linear differential equations; 2nd, the theory of series; 3rd, the theory of generating functions; 4th, the theory of equations of finite differences.

A. *Preliminary Theorems.*

Prop. 1. Let π and ϱ be distributive symbols which combine in subjection to the law

$$\varrho f(\pi)u=\lambda f(\pi)\varrho u, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1.)$$

λ being a functional symbol operating on π, in such manner that $\lambda f(\pi)=f(\varphi(\pi))$, it is required to expand $f(\pi+\varrho)$ in ascending powers of ϱ.

We have

$$\left.\begin{aligned} &\varrho f(\pi)u=\lambda f(\pi)\varrho u,\\ &\varrho^2 f(\pi)u=\lambda^2 f(\pi)\varrho^2 u,\\ &\quad . \quad . \quad . \quad . \quad . \quad .\\ &\varrho^m (f\pi)u=\lambda^m f(\pi)\varrho^m u \end{aligned}\right\} . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2.)$$

Let $\pi+\varrho=\eta$, then $f(\pi+\varrho)u=f(\eta)u$. Now, as η operates solely on u, it is *commutative* with respect to the constants in $f(\eta)$, wherefore

$$\eta f(\eta)u=f(\eta)\eta u.$$

Or dropping the subject u, and writing $\pi+\varrho$ for η,

$$(\pi+\varrho)f(\pi+\varrho)=f(\pi+\varrho)(\pi+\varrho).$$

Let $f(\pi+\varrho)u=\Sigma f_m(\pi)\varrho^m u$, then, still supposing u to be understood,

$$\begin{aligned}(\pi+\varrho)f(\pi+\varrho)&=\pi\Sigma f_m(\pi)\varrho^m+\varrho\Sigma f_m(\pi)\varrho^m,\\ &=\Sigma\pi f_m(\pi)\varrho^m+\Sigma\varrho f_m(\pi)\varrho^m,\\ &=\Sigma\pi f_m(\pi)\varrho^m+\Sigma\lambda f_m(\pi)\varrho^{m+1} \text{ by (2).}\end{aligned}$$

Under the first Σ in the second member the coefficient of ϱ^m is $xf_m(x)$, and under the second Σ the coefficient of ϱ^m is $\lambda f_{m-1}(x)$, wherefore the aggregate coefficient of ϱ^m in the expansion of $(x+\varrho)f(x+\varrho)$ is

$$xf_m(x)+\lambda f_{m-1}(x). \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3.)$$

Again, we have

$$\begin{aligned} f(x+\varrho)(x+\varrho) &= \Sigma f_m(x)\varrho^m(x+\varrho), \\ &= \Sigma f_m(x)\varrho^m x + \Sigma f_m(x)\varrho^{m+1}, \\ &= \Sigma f_m(x)\lambda^m x\varrho^m + \Sigma f_m(x)\varrho^{m+1} \text{ by (2.),} \end{aligned}$$

wherein the aggregate coefficient of ϱ^m is

$$f_m(x)\lambda^m x + f_{m-1}(x).$$

Equating this expression with (3.), we have

$$f_m(x)\lambda^m x + f_{m-1}(x) = xf_m(x) + \lambda f_{m-1}(x);$$

$$\therefore \qquad f_m(x) = \frac{\lambda f_{m-1}(x) - f_{m-1}(x)}{\lambda^m x - x};$$

or separating the symbols,

$$f_m(x) = \frac{(\lambda-1)f_{m-1}(x)}{(\lambda^m-1)x}, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4.)$$

which expresses the law of formation of the coefficients.

The first term $f_0(x)$ is equal to $f(x)$: this may be proved by induction from the particular cases of $(x+\varrho)^2$, $(x+\varrho)^3$, &c., but perhaps more rigidly thus. Let k be a symbol such that $kf(x)=f_0(x)$. Then the first term of the expansion of $(x+\varrho)f(x+\varrho)$ is $kxf(x)$; but by (3.) this term is $xf_0(x)=xkf(x)$, therefore

$$kxf(x) = xkf(x);$$

wherefore x and k are *commutative*. It is hence evident that k can only operate as a constant multiplier, the value of which is independent of the form of $f(x)$. Let $f(x)=x$, then, since $f(x+\varrho)=x+\varrho$, it is evident that $k=1$, wherefore

$$f_0(x) = f(x),$$

and the expansion is completely determined.

Cor. If the symbols x and ϱ combine according to the law

$$\varrho f(x)u = f(x+\Delta x)\varrho u,$$

Δx being any constant increment, then

$$f(x+\varrho) = f(x) + \frac{\Delta}{\Delta x}f(x)\varrho + \frac{\Delta^2}{\Delta x^2}f(x)\frac{\varrho^2}{1.2} + \frac{\Delta^3}{\Delta x^3}f(x)\frac{\varrho^3}{1.2.3}, \quad . \quad . \quad . \quad . \quad (\text{I.})$$

the interpretation of $\frac{\Delta}{\Delta x}$ being

$$\frac{\Delta}{\Delta x}f(x) = \frac{f(x+\Delta x)-f(x)}{\Delta x};$$

For $\lambda f(x)=f(x+\Delta x)$. Hence $\lambda^m x = x+m\Delta x$ and (4.) gives

$$f_m(\pi)=\frac{f_{m-1}(\pi+\Delta\pi)-f_{m-1}(\pi)}{m\Delta\pi}$$
$$=\frac{1}{m}\frac{\Delta}{\Delta\pi}f_{m-1}(\pi),$$

whence the theorem is manifest.

If $\Delta\pi=-1$, we find

$$f(\pi+\varrho)=f_0(\pi)+f_1(\pi)\varrho+\frac{1}{1.2}f_2(\pi)\varrho^2+\text{ \&c.},$$

where $f_0(\pi)=f(\pi)$, and in general $f_m(\pi)=f_{m-1}(\pi)-f_{m-1}(\pi-1)$.

If $\Delta\pi$ vanishes the symbols π and ϱ are commutative, $\frac{\Delta}{\Delta\pi}$ becomes $\frac{d}{d\pi}$, and (I.) is reduced to Taylor's theorem.

Prop. 2. If $\varrho=\varphi(x)\varepsilon^{r\frac{d}{dx}}$ then x and ϱ combine according to the law

$$\varrho f(x)u=f(x+r)\varrho u.$$

For writing u_x in the place of u, we have

$$\varrho f(x)u_x=\varphi(x)\varepsilon^{r\frac{d}{dx}}f(x)u_x,$$
$$=\varphi(x)f(x+r)u_{x+r},$$
$$=f(x+r)\varphi(x)\varepsilon^{r\frac{d}{dx}}u_x,$$
$$=f(x+r)\varrho u.$$

Prop. 3. If $\pi=\frac{n\varphi(x)\varepsilon^{r\frac{d}{dx}}-x}{r}$ and $\varrho=\varphi(x)\varepsilon^{r\frac{d}{dx}}$, then π and ϱ combine according to the law

$$\varrho f(\pi)u=f(\pi-1)\varrho u,$$

we have $f(\pi)=f\left(\frac{n\varrho-x}{r}\right)$. Now ϱ combines with x according to the law

$$\varrho f(x)u=f(x+r)\varrho u, \quad \ldots\ldots\ldots \quad (5.)$$

and ϱ combines with ϱ as if it were a mere symbol of quantity; hence

$$\varrho f\left(\frac{n\varrho-x}{r}\right)u=f\left(\frac{n\varrho-(x+r)}{r}\right)\varrho u \text{ by Prop. 2,}$$
$$=f\left(\frac{n\varrho-x}{r}-1\right)\varrho u,$$
$$=f(\pi-1)\varrho u.$$

This result may also be proved by expanding $f\left(\frac{n\varrho-x}{r}\right)$ in ascending powers of ϱ by Prop. 1, and operating with ϱ on each term of the series.

Prop. 4. If $\pi=\frac{x\varepsilon^{r\frac{d}{dx}}-x}{r}$ and $\varrho=x\varepsilon^{r\frac{d}{dx}}$, then π and ϱ satisfy the following relations,

$$f(\pi)\varrho^m u=\varrho^m f(\pi+m)u, \quad \ldots\ldots\ldots \text{(II.)}$$

$$f(\pi)\varrho^m =f(m)\varrho^m, \quad \ldots\ldots\ldots\ldots \text{(III.)}$$

the subject u becoming unity in the second of the above equations.

For in the last Prop. let $\varphi(x)=x$, and $n=1$, then $\pi=\frac{xr^{\frac{d}{dx}}-x}{r}$, $\varrho=xr^{\frac{d}{dx}}$, and

$$\varrho f(\pi)u=f(\pi-1)\varrho u.$$

By induction, $\varrho^m f(\pi)u=f(\pi-m)\varrho^m u$;

$$\therefore \quad f(\pi)\varrho^m u=\varrho^m f(\pi+m)u,$$

which is the first of the proposed relations. Now m being a constant is *commutative* with π, wherefore expanding $f(\pi+m)$ in the second member by TAYLOR's theorem, in ascending powers of π, we have

$$f(\pi)\varrho^m u=\varrho^m\{f(m)u+f'(m)\pi u+f''(m)\tfrac{\pi^2}{1.2}u+\&c.\}.$$

For u write u_x, then

$$\pi u_x=\frac{xr^{\frac{d}{dx}}-x}{r}u_x,$$

$$=\frac{xu_{x+r}-xu_x}{r},$$

which vanishes if $u_x=1$. In like manner $\pi^2 u_x$, $\pi^3 u_x$, &c. vanish under similar circumstances, wherefore

$$f(\pi)\varrho^m(1)=\varrho^m f(m)(1),$$

$$f(\pi)\varrho^m=f(m)\varrho^m,$$

which is the second of the relations in question.

Prop. 5. The same values being attributed to π and ϱ, we shall have

$$\pi(\pi-1)..(\pi-n+1)u=x(x+r)..(x+(n-1)r)\left(\frac{\Delta}{\Delta x}\right)^n u, \quad \ldots \text{(IV.)}$$

wherein $\Delta x=r$.

We have $$\pi=\frac{\varrho-x}{r},$$

$$\therefore \quad \varrho^{-1}\pi u=\frac{1-\varrho^{-1}x}{r}u.$$

Now $$\varrho^{-1}xu=\left(xr^{\frac{d}{dx}}\right)^{-1}xu=s^{-r\frac{d}{dx}}x^{-1}xu=s^{-r\frac{d}{dx}}u,$$

therefore $$\varrho^{-1}\pi u=\frac{1-s^{-r\frac{d}{dx}}}{r}u,$$

$$\therefore \quad (\varrho^{-1}\pi)^n u=\left\{\frac{1-s^{-r\frac{d}{dx}}}{r}\right\}^n u.$$

Now $$(\varrho^{-1}\pi)^2 u=\varrho^{-1}\pi\varrho^{-1}\pi u=\varrho^{-2}(\pi-1)\pi u=\varrho^{-2}\pi(\pi-1)u,$$

and by induction, $(\varrho^{-1}\pi)^n u=\varrho^{-n}\pi(\pi-1)..(\pi-n+1)u,$

$$\therefore \quad \varrho^{-n}\pi(\pi-1)..(\pi-n+1)u=\left\{\frac{1-\varepsilon^{-r\frac{d}{dx}}}{r}\right\}^n u,$$

whence $$\pi(\pi-1)..(\pi-n+1)u=\varrho^n\left\{\frac{1-\varepsilon^{-r\frac{d}{dx}}}{r}\right\}^n u.$$

But $$\varrho^n=x(x+r)..(x+(n-1)r)\varepsilon^{nr\frac{d}{dx}},$$

wherefore $$\pi(\pi-1)..(\pi-n+1)u=x(x+r)..(x+(n-1)r)\left\{\frac{\varepsilon^{r\frac{d}{dx}}-1}{r}\right\}^n u,$$

$$=x(x+r)..(x+(n-1)r)\left(\frac{\Delta}{\Delta x}\right)^n u.$$

Scholium. In the values of π and ϱ employed in the two last propositions, if we expand the exponential $\varepsilon^{r\frac{d}{dx}}$, we find

$$\pi=x\left(\frac{d}{dx}+\frac{1}{1.2}r\frac{d^2}{dx^2}+\frac{1}{1.2.3}r^2\frac{d^3}{dx^3}+\&c.\right),$$

$$\varrho=x\left(1+r\frac{d}{dx}+\frac{r^2}{1.2}\frac{d^2}{dx^2}+\&c.\right).$$

Let $r=0$, then $\pi=x\frac{d}{dx}$, $\varrho=x$. Put $x=\varepsilon^\theta$, then $\pi=\frac{d}{d\theta}$, $\varrho=\varepsilon^\theta$. For simplicity, let us represent $\frac{d}{d\theta}$ by D, then by (II.), (III.), (IV.) the symbols D and ε^θ satisfy the following relations:

$$f(\mathrm{D})\varepsilon^{m\theta}u=\varepsilon^{m\theta}f(\mathrm{D}+m)u. \quad \ldots\ldots\ldots \quad \text{(V.)}$$

$$f(\mathrm{D})\varepsilon^{m\theta}=f(m)\varepsilon^{m\theta}. \quad \ldots\ldots\ldots \quad \text{(VI.)}$$

$$\mathrm{D}(\mathrm{D}-1)..(\mathrm{D}-n+1)u=x^n\left(\frac{d}{dx}\right)^n u. \quad \ldots\ldots \quad \text{(VII.)}$$

These are known relations. With a view to the maintenance of an unbroken analogy, it has, however, been thought better to deduce them from the properties of the more general system in π and ϱ, than to assume them as already proved.

B. § 1. *Theory of Linear Differential Equations.*

Prop. 1. Every linear differential equation which can, with or without expansion of its coefficients, be placed in the form

$$(a+bx+cx^2..)\frac{d^nu}{dx^n}+(a'+b'x+c'x^2..)\frac{d^{n-1}u}{dx^{n-1}}+\&c.=\mathrm{X},$$

may be reduced to the *symbolical* form

$$f_0(\mathrm{D})u+f_1(\mathrm{D})\varepsilon^\theta u+f_2(\mathrm{D})\varepsilon^{2\theta}u...=\mathrm{U}, \quad \ldots\ldots \quad \text{(VIII.)}$$

wherein f_0, f_1, f_2... are functional symbols, and U is a function of ε^θ.

For multiplying by x^n, and considering first the expression $(a+bx+cx^2..)x^n\frac{d^nu}{dx^n}$, let $x=\varepsilon^\delta$, we have

$$\begin{aligned}&(a+b\varepsilon^\delta+c\varepsilon^{2\delta}..)\mathrm{D}(\mathrm{D}-1)..(\mathrm{D}-n+1)u,\\&=a\mathrm{D}(\mathrm{D}-1)..(\mathrm{D}-n+1)u,\\&\quad+b(\mathrm{D}-1)(\mathrm{D}-2)..(\mathrm{D}-n)\varepsilon^\delta u,\\&\quad+c(\mathrm{D}-2)(\mathrm{D}-3)..(\mathrm{D}-n-1)\varepsilon^{2\delta}u.\\&\quad\ldots\ldots\ldots\ldots\end{aligned}$$

In like manner may every term in the first member of the original equation be reduced; also the second member, which is a function of x, will become a function of ε^δ; the aggregate of these results will produce an equation of the form (VIII.).

More generally, let it be supposed that we have a system of linear differential equations, total or partial, the dependent variables being $u_1v_1..$ the independent variables $x_1x_2..$ whereof the second members of the equations are functions; if we assume $x_1=\varepsilon^{\delta_1}$, $x_2=\varepsilon^{\delta_2}..$ the transformed equations may be so written as to satisfy the following conditions.

1st. Every term involving u shall be of the form $\varphi(\mathrm{D}_1, \mathrm{D}_2..)\varepsilon^{r_1\delta_1+r_2\delta_2}u$, and similarly for every term involving v.

2nd. The second members shall be functions of ε^{δ_1}, ε^{δ_2}...

Let us now consider the expression $f_0(\mathrm{D})u+f_1(\mathrm{D})\varepsilon^\delta u+f_2(\mathrm{D})\varepsilon^{2\delta}u..$, and let us therein assume $u=\Sigma u_m\varepsilon^{m\delta}$, then passing the symbols $f_0(\mathrm{D})$, $f_1(\mathrm{D})$... within the sign of summation, collecting the coefficients of $\varepsilon^{m\delta}$, and observing that $f_0(\mathrm{D})\varepsilon^{m\delta}=f_0(m)\varepsilon^{m\delta}$, &c., we have

$$f_0(\mathrm{D})u+f_1(\mathrm{D})\varepsilon^\delta u+f_2(\mathrm{D})\varepsilon^{2\delta}u...=\Sigma\{(f_0(m)u_m+f_1(m)u_{m-1}+f_2(m)u_{m-2}...)\varepsilon^{m\delta}\} \quad . \quad . \quad \text{(IX.)}$$

which is a particular form of the *fundamental theorem of development*.

To any aggregate of terms of the form $\varphi(\mathrm{D}_1, \mathrm{D}_2..)\varepsilon^{r_1\delta_1+r_2\delta_2..}u$ the same analysis is applicable, whence our fundamental theorem, viz.

If $u=\Sigma u_{m,n...}\varepsilon^{m\delta_1+n\delta_2..}$,

then $$\varphi(\mathrm{D}_1, \mathrm{D}_2..)\varepsilon^{r_1\delta_1+r_2\delta_2..}u=\Sigma\{\varphi(m,n..)u_{m-r_1,\,n-r_2..}\varepsilon^{m\delta_1+n\delta_2...}\}. \quad . \quad . \quad . \quad . \quad . \quad . \quad \text{(X.)}$$

In applying this theorem to an expression consisting of many terms, the sign Σ must be affixed to the aggregate in the second member, as in (IX.), and not to each term separately.

The relation which the first member of (IX.) bears to the linear differential equation, is the same as is borne by the coefficient of $\varepsilon^{m\delta}$ in the second member to the linear equation of finite differences. This analogy extends to the fundamental theorem, which may be defined as a general relation connecting any linear differential equation, or system of linear differential equations, with a corresponding equation or system of equations in finite differences.

B. § 2. *On the Solution of Linear Differential Equations by Series.*

Since, when $u=\Sigma u_m \varepsilon^{m\theta}$, we have

$$f_0(\mathrm{D})u+f_1(\mathrm{D})\varepsilon^{\theta}u+f_2(\mathrm{D})\varepsilon^{2\theta}u\ldots=\Sigma\{(f_0(m)u_m+f_1(m)u_{m-1}+f_2(m)u_{m-2}\ldots)\varepsilon^{m\theta}\},$$

it follows that the linear differential equation

$$f_0(\mathrm{D})u+f_1(\mathrm{D})\varepsilon^{\theta}u+f_2(\mathrm{D})\varepsilon^{2\theta}u\ldots=0 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6.)$$

will be satisfied by the assumption $u=\Sigma u_m \varepsilon^{m\theta}$, provided that

$$f_0(m)u_m+f_1(m)u_{m-1}+f_2(m)u_{m-2}\ldots=0. \quad . \quad . \quad . \quad . \quad . \quad . \quad (7.)$$

Let p be the lowest value of m, then since u_{p-1}, u_{p-2}, &c. vanish, we have from (7.) $f_0(p)=0$, whence the values of p are determined. If p have n real values, there will be n ascending developments of the form

$$u=u_p\varepsilon^{p\theta}+u_{p+1}\varepsilon^{(p+1)\theta}+u_{p+2}\varepsilon^{(p+2)\theta}\ldots \textit{ ad infinitum},$$

u_p in each development being arbitrary, and the succeeding coefficients formed according to the law (7.).

This method fails when p has equal or imaginary values, but the following rule is of universal application.

Rule.—*Solve the equation* $f_0(\mathrm{D})u=0$, *and let the complete integral be*

$$u=\mathrm{AP}+\mathrm{BQ}+\mathrm{CR}\ldots,$$

wherein A, B, C.. *are arbitrary constants, and* P, Q, R.. *functions of* θ. *Substitute this value of* u *in the original equation* (6.), *regarding* A, B, C.. *as variable parameters*; *the result will be of the form*

$$\mathrm{A'P}+\mathrm{B'Q}+\mathrm{C'R}\ldots=0, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (\mathrm{XI.})$$

A', B', C'.., *being linear functions of* A, B, C.., *and their differential coefficients*; P, Q, R.., *as before. The system of equations*

$$\mathrm{A'}=0, \quad \mathrm{B'}=0, \quad \mathrm{C'}=0\ldots.$$

being then integrated by the fundamental theorem, the values of A, B, C *will be determined in the forms* $\mathrm{A}=\Sigma a_m \varepsilon^{m\theta}$, $\mathrm{B}=\Sigma b_m \varepsilon^{m\theta}$, &c., a_0 b_0.. *being arbitrary constants**.

The equation to be solved is

$$f_0(\mathrm{D})u+f_1(\mathrm{D})\varepsilon^{\theta}u\ldots+f_r(\mathrm{D})\varepsilon^{r\theta}u=0,$$

in which $f_0(\mathrm{D})f_1(\mathrm{D})$, &c. are rational and integral combinations of D. This equation may be put under the form

$$\Sigma\{f_n(\mathrm{D})\varepsilon^{n\theta}u\}=0, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (8.)$$

the summation extending from $n=0$ to $n=r$.

Now the solution of the equation $f_0(\mathrm{D})u=0$ is of the form

$$u=\mathrm{AP}+\mathrm{BQ}+\mathrm{CR}+\&\mathrm{c.}, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (9.)$$

wherein A, B, C... are arbitrary constants, and P, Q, R... particular values of $\{f_0(\mathrm{D})\}^{-1}0$. Substituting this expression in (8.), and regarding A, B, C... as variable

* The reader may find it advantageous to look over some of the examples in which this rule is applied before reading the demonstration.

parameters, we have

$$\Sigma\{f_n(D)\varepsilon^{mt}(AP+BQ...)\}=0, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (10.)$$

to determine the general character of which let us first consider the term $f_n(D)\varepsilon^{mt}AP$.

Separating the factors $\varepsilon^{mt}A$ and P, if we expand the operative symbol $f_n(D)$, as in LEIBNITZ's theorem, we have

$$f_n(D)\varepsilon^{mt}AP=f_n(D)\varepsilon^{mt}A\times P+f'_n(D)\varepsilon^{mt}A\times DP+f''_n(D)\varepsilon^{mt}A\times\frac{1}{1.2}D^2P+\&c. \quad . \quad . \quad (10'.)$$

The general value of D^iP may be thus ascertained:

$$\begin{aligned}(D)^iP&=(D)^i\{f_0(D)\}^{-1}0,\\&=\{f_0(D)\}^{-1}(D)^i0,\\&=\{f_0(D)\}^{-1}0,\\&=LP+MQ+NR...,\end{aligned}$$

L, M, N.. being arbitrary constants. In the present instance, as P does not involve any arbitrary constants, and as the direct operation $(D)^i$ cannot introduce any, it is evident that L, M, N are simply numerical coefficients.

The above expression for $(D)^iP$ applying to every term of the second member of (10'.), it is obvious that $f_n(D)\varepsilon^{mt}AP$ will be a linear function of P, Q, R.., whose coefficients are of the general type $\varphi_n(D)\varepsilon^{mt}A$, $\varphi_n(D)$ denoting a rational and integral combination of (D). In like manner, $f_n(D)\varepsilon^{mt}BQ$ will be a linear function of P, Q, R, the coefficients whereof will assume the form $\psi_n(D)\varepsilon^{mt}B$. Wherefore the equation (10.) will become

$$A'P+B'Q+C'R..=0, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (11.)$$

every coefficient A', B', &c. being of the type

$$\Sigma\{\varphi_n(D)\varepsilon^{mt}A\}+\Sigma\{\psi_n(D)\varepsilon^{mt}B\}+\&c.;$$

and it is to be remarked, that the terms in this expression which correspond to a particular value of n, are derived from the term which answers to the same value of n in the primitive equation (8.).

In order to satisfy (11.) independently of the particular values of P, Q, R, let us assume

$$A'=0, \ B'=0, \ C'=0. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (12.)$$

Each of these equations being of the general form above given, we shall have by the fundamental theorem,

$$A=\Sigma(a_m\varepsilon^{mt}), \ B=\Sigma(b_m\varepsilon^{mt}), \ C=\Sigma(c_m\varepsilon^{mt}), \ \&c.$$

the successive values of a_m, b_m being connected by a system of relations of the general form,

$$\Sigma(\varphi_n(m)a_{m-n})+\Sigma(\psi_n(m)b_{m-n})...=0.$$

To find the lowest value or values of m in a_m, b_m, &c., we must assume a_{m-1}, b_{m-1}, &c. to vanish, whence the last equation gives

$$\varphi_0(m)a_m+\psi_0(m)b_m...=0.$$

Now this is the type of the system of relations derived from the term $f_0(D)u$. But the equation $f_0(D)u=0$ is satisfied by the assumption $u=AP+BQ...$ in which A, B.. are constants, that is, by the assumption $u=a_0P+b_0Q..$, whence the lowest value of m in $a_m\ b_m..$ is 0, and the system (12.) is universally satisfied.

Ex. 1. Let the primitive equation be $x^2\frac{d^2u}{dx^2}-\left((a+b-1)x+qx^2\right)\frac{du}{dx}+(ab+cqx)u=0$.

Putting $x=\varepsilon^\theta$, we have

$$D(D-1)u-(a+b-1)Du-q\varepsilon^\theta Du+(ab+cq\varepsilon^\theta)u=0.$$

Now $q\varepsilon^\theta Du=q(D-1)\varepsilon^\theta u$ by (V.), hence we have

$$\{D(D-1)-(a+b-1)D+ab\}u-(q(D-1)-cq)\varepsilon^\theta u=0,$$

or

$$(D-a)(D-b)u-q(D-c-1)\varepsilon^\theta u=0,$$

which is the symbolical form of the equation, whence $u=\Sigma u_m\varepsilon^{m\theta}$, with the relation

$$(m-a)(m-b)u_m-q(m-c-1)u_{m-1}=0,$$

whence

$$u_m=q\frac{(m-c-1)u_{m-1}}{(m-a)(m-b)}.$$

The equation $(m-a)(m-b)=0$ gives $m=a$ or b, which are consequently the lowest indices of the development. If, therefore, we represent the arbitrary constants u_a, u_b by A and B, we have

$$u=A\left(x^a+q\frac{a-c}{1(a-b+1)}x^{a+1}+q^2\frac{(a-c)(a-c+1)}{1.2(a-b+1)(a-b+2)}x^{a+2}+\&c.\right)$$

$$+B\left(x^b+q\frac{b-c}{1(b-a+1)}x^{b+1}+q^2\frac{(b-c)(b-c+1)}{1.2(b-a+1)(b-a+2)}x^{b+2}+\&c.\right).$$

Ex. 2. Given $x^3\frac{d^3u}{dx^3}+3x^2\frac{d^2u}{dx^2}+x\frac{du}{dx}+qx^nu=0$, to find u.

Putting $x=\varepsilon^\theta$, we have by (VII.),

$$\{D(D-1)(D-2)+3D(D-1)+D\}u+q\varepsilon^{n\theta}u=0,$$

$$\therefore\quad D^3u+q\varepsilon^{n\theta}u=0. \qquad (13.)$$

Now as D represents $\frac{d}{d\theta}$, the equation $D^3u=0$ gives $u=A+B\theta+C\theta^2$. Substituting this value in (13.), there results

$$D^3A+q\varepsilon^{n\theta}A+(D^3B+q\varepsilon^{n\theta}B)\theta+3D^2B+(D^3C+q\varepsilon^{n\theta}C)\theta^2+6D^2C\theta+6DC=0.$$

Whence by the rule

$$D^3A+q\varepsilon^{n\theta}A+3D^2B+6DC=0,$$

$$D^3B+q\varepsilon^{n\theta}B+6D^2C=0,$$

$$D^3C+q\varepsilon^{n\theta}C=0;$$

wherefore by the fundamental theorem

$$A=\Sigma a_m\varepsilon^{m\theta},\quad B=\Sigma b_m\varepsilon^{m\theta},\quad C=\Sigma c_m\varepsilon^{m\theta},$$

$$m^3a_m+qa_{m-n}+3m^2b_m+6mc_m=0,$$
$$m^3b_m+qb_{m-n}+6m^2c_m=0,$$
$$m^3c_m+qc_{m-n}=0,$$

whence we find

$$\left.\begin{aligned} a_m&=-q\frac{m^2a_{m-n}-3mb_{m-n}+12c_{m-n}}{m^5}\\ b_m&=-q\frac{mb_{m-n}-6c_{m-n}}{m^4}\\ c_m&=-q\frac{c_{m-n}}{m^3}. \end{aligned}\right\} \quad \ldots\ldots\ldots \quad (14.)$$

If we now substitute the preceding values of A, B, C in the equation $u=A+B\theta+C\theta^2$, and then change ε^x into x, θ into $\log x$, we shall have

$$u=(a_0+a_nx^n+a_{2n}x^{2n}\ldots)$$
$$+\log x(b_0+b_nx^n+b_{2n}x^{2n}\ldots)$$
$$+(\log x)^2(c_0+c_nx^n+c_{2n}x^{2n}\ldots),$$

a_0, b_0, c_0 being arbitrary, and the succeeding coefficients determined by (14.).

The solution of the linear differential equation $U=X$ is found by obtaining a particular integral, and adding to this the complete integral of the equation $U=0$.

A particular integral of the equation $U=X$ will be given by the fundamental theorem whenever X is developable in ascending powers of x. If X is of the form $X_0+X_1\log x+X_2(\log x)^2\ldots+X_n(\log x)^n$ where X_0, X_1.. are respectively developable in powers of x, we must assume $u=A+B\theta..+P\theta^n$, where A, B...P are variable parameters, to be determined by the fundamental theorem, in the forms $A=\Sigma a_m\varepsilon^{mx}$, $B=\Sigma b_m\varepsilon^{mx}$, &c.

On the same principle we must proceed if such forms as $\cos(n\log x)$, $\sin(n\log x)$, &c. are found in the second member.

Ex. 3. Given $x^2\frac{d^2u}{dx^2}+x\frac{du}{dx}+xu=\log(x)$.

Putting $x=\varepsilon^t$, we have

$$D^2u+\varepsilon^tu=\theta.$$

Make $u=A+B\theta$, then on reducing

$$D^2A+2DB+\varepsilon^tA+(D^2B+\varepsilon^tB-1)\theta=0,$$

whence, as in preceding examples,

$$D^2A+2DB+\varepsilon^tA=0,$$
$$D^2B+\varepsilon^tB=1.$$

This system of equations differs from those before considered, in that the second members do not both vanish. The fundamental theorem gives

$$A=\Sigma a_m\varepsilon^{mx},\quad B=\Sigma b_m\varepsilon^{mx},$$
$$\Sigma\{(m^2a_m+2mb_m+a_{m-1})\varepsilon^{mx}\}=0,$$
$$\Sigma\{(m^2b_m+b_{m-1})\varepsilon^{mx}\}=1,$$

whence $m^2a_m+2mb_m+a_{m-1}=0$ for all values of m, and $m^2b_m+b_{m-1}=0$ for all values of m except $m=0$, which gives $m^2b_m+b_{m-1}=1$, or $b_{-1}=1$; also from the other equation, $a_{-1}=0$. From these, the values of a_m, b_m, corresponding to negative values only of m, may be determined; whence writing x for ϵ^t, and solving the above equations relatively to a_{m-1} and b_{m-1}, we have

$$u=a_{-1}+\frac{a_{-2}}{x}+\frac{a_{-3}}{x^2}+\&c.$$

$$+\log x\left(b_{-1}+\frac{b_{-2}}{x}+\frac{b_{-3}}{x^2}+\&c.\right),$$

where

$$a_{-1}=0,\ b_{-1}=1;$$

and in general

$$a_{m-1}=-(m^2a_m+2mb_m),\ b_{m-1}=-m^2b_m.$$

This is a particular integral; to complete the solution we must add the general value of u given by the equation $x^2\frac{d^2u}{dx^2}+x\frac{du}{dx}+xu=0$, which, as in the preceding examples, is found to be

$$a_0+a_1x+a_2x^2\ldots$$
$$+\log x(b_0+b_1x+b_2x^2\ldots),$$

wherein a_0, b_0 are arbitrary constants, and the succeeding coefficients given by the law

$$a_m=-\frac{ma_{m-1}-2b_{m-1}}{m^3},\quad b_m=-\frac{b_{m-1}}{m^3}.$$

Ex. 4. Given $(x^2+qx^4)\frac{d^2u}{dx^2}+(x+px^2+5qx^3)\frac{du}{dx}+(n^2+px+(4q+r)x^2)u=0$.

On assuming $x=\epsilon^t$, we get

$$(\mathrm{D}^2+n^2)u+p\mathrm{D}\epsilon^t u+(q\mathrm{D}^2+r)\epsilon^{2t}u=0, \quad \ldots\ldots \quad (15.)$$

which, as a final example, we propose to integrate both by ascending and by descending developments.

The equation $\mathrm{D}^2u+n^2u=0$ gives $u=\mathrm{A}\cos n\theta+\mathrm{B}\sin n\theta$; substituting this value in (15.), and regarding A and B as parameters, we have

$$(\mathrm{D}^2+n^2)u=\cos n\theta(\mathrm{D}^2\mathrm{A}+2n\mathrm{DB})+\sin n\theta(\mathrm{D}^2\mathrm{B}-2n\mathrm{DA})$$
$$p\mathrm{D}\epsilon^t u=\cos n\theta(p\mathrm{D}\epsilon^t\mathrm{A}+pn\epsilon^t\mathrm{B})+\sin n\theta(p\mathrm{D}\epsilon^t\mathrm{B}-pn\epsilon^t\mathrm{A})$$
$$q\mathrm{D}^2\epsilon^{2t}u=\cos n\theta(-qn^2\epsilon^{2t}\mathrm{A}+q\mathrm{D}^2\epsilon^{2t}\mathrm{A}+2nq\mathrm{D}\epsilon^{2t}\mathrm{B})$$
$$+\sin n\theta(-qn^2\epsilon^{2t}\mathrm{B}+q\mathrm{D}^2\epsilon^{2t}\mathrm{B}-2nq\mathrm{D}\epsilon^{2t}\mathrm{A})$$
$$r\epsilon^{2t}u=\cos(n\theta)r\epsilon^{2t}\mathrm{A}+\sin(n\theta)r\epsilon^{2t}\mathrm{B}.$$

Collecting these results, and equating to 0 the aggregate coefficients of $\cos n\theta$ and $\sin n\theta$,

$$\mathrm{D}^2\mathrm{A}+2n\mathrm{DB}+p(\mathrm{D}\epsilon^t\mathrm{A}+n\epsilon^t\mathrm{B})+(q(\mathrm{D}^2-n^2)+r)\epsilon^{2t}\mathrm{A}+2nq\mathrm{D}\epsilon^{2t}\mathrm{B}=0,$$
$$\mathrm{D}^2\mathrm{B}-2n\mathrm{DA}+p(\mathrm{D}\epsilon^t\mathrm{A}-n\epsilon^t\mathrm{B})+(q(\mathrm{D}^2-n^2)+r)\epsilon^{2t}\mathrm{B}-2nq\mathrm{D}\epsilon^{2t}\mathrm{A}=0;$$

the solution whereof by the fundamental theorem, is

$$A=\Sigma a_m \varepsilon^{mt}, \quad B=\Sigma b_m \varepsilon^{mt},$$

$$m^2a_m+2mnb_m+pma_{m-1}+pnb_{m-1}+(q(m^2-n^2)+r)a_{m-2}+2qmnb_{m-2}=0,$$

$$m^2b_m-2mna_m+pmb_{m-1}-pna_{m-1}+(q(m^2-n^2)+r)b_{m-2}-2qmna_{m-2}=0.$$

Whence making $\varepsilon^t=x$, and determining the values of a_m, b_m from the two last equations, we have

$$\left.\begin{aligned} u=&\cos(n\log x)(a_0+a_1x+a_2x^2+\&c.)\\ &+\sin(n\log x)(b_0+b_1x+b_2x^2+\&c.)\end{aligned}\right\} \quad \ldots\ldots \quad (16.)$$

a_0 and b_0 being arbitrary, and the remaining coefficients formed on the laws

$$a_m=-\frac{p(m^2+2n^2)a_{m-1}-pmnb_{m-1}+(q(m^2+3n^2)+r)ma_{m-2}+2n(qn^2-r)b_{m-2}}{m(m^2+4n^2)}$$

$$b_m=-\frac{p(m^2+2n^2)b_{m-1}+pmna_{m-1}+(q(m^2+3n^2)+r)mb_{m-2}-2n(qn^2-r)a_{m-2}}{m(m^2+4n^2)}.$$

If $q=0$, $p=0$, $r=1$, we have for the primitive equation

$$x^2\frac{d^2u}{dx^2}+x\frac{du}{dx}+(n^2+x^2)u=0,$$

and for its complete integral,

$$\begin{aligned} u=&\cos(n\log x)(a_0+a_2x^2+a_4x^4\ldots)\\ &+\sin(n\log x)(b_0+b_2x^2+b_4x^4\ldots),\end{aligned}$$

where in general

$$a_m=-\frac{ma_{m-2}-2nb_{m-2}}{m(m^2+4n^2)}, \quad b_m=-\frac{mb_{m-2}+2na_{m-2}}{m(m^2+4n^2)}.$$

The above developments terminate in convergency for every value of x. The more general developments (16.) from which they are derived, become, in certain cases, divergent, as is seen by making m infinite in the equations determining a_m, b_m. The descending developments which are then to be employed may be thus obtained.

We have

$$(D^2+n^2)u+pD\varepsilon^t u+(qD^2+r)\varepsilon^{2t}u=0.$$

Multiply by ε^{-2t} and invert the order of the terms, then

$$(q(D+2)^2+r)u+p(D+2)\varepsilon^{-t}u+((D+2)^2+n^2)\varepsilon^{-2t}u=0.$$

Put $\theta=-\theta_1$, and the above becomes

$$(q(D-2)^2+r)u-p(D-2)\varepsilon^{t_1}u+((D-2)^2+n^2)\varepsilon^{2t_1}u=0.$$

The equation $(q(D-2)^2+r)u=0$ determines the form of the general solution, which will differ according as $\frac{r}{q}$ shall be positive, negative, or 0. The process is in all respects the same as in the preceding examples, except that in the result we shall have $\varepsilon^{t_1}=\frac{1}{x}$.

If $\frac{r}{q}$ is negative, we find

$$u=\frac{1}{x^{2+\sqrt{-\frac{r}{q}}}}\left(a_0+\frac{a_1}{x}+\frac{a_2}{x^2}\ldots\right)+\frac{1}{x^{2-\sqrt{-\frac{r}{q}}}}\left(b_0+\frac{b_1}{x}+\frac{b_2}{x^2}\ldots\right).$$

If $\frac{r}{q}=0$, the solution is of the form

$$u=\frac{1}{x^2}\left\{a_0+\frac{a_1}{x}+\frac{a_2}{x^2}\ldots+\log x(b_0+b_1x+b_2x^2)\right\}.$$

If $\frac{r}{q}$ is positive,

$$u=\frac{1}{x^2}\left\{\cos\left(\sqrt{\frac{r}{q}}\log x\right)\left(a_0+\frac{a_1}{x}+\frac{a_2}{x^2}\ldots\right)+\sin\left(\sqrt{\frac{r}{q}}\log x\right)\left(b_0+\frac{b_1}{x}+\frac{b_2}{x^2}\ldots\right)\right\}.$$

In all these the arbitrary constants are a_0 and b_0, and the values of a_1, b_1, a_2, b_2 are determined by equations similar to those given in the former examples.

Objections are commonly urged against the solutions of linear differential equations in series, on the ground that the condition of convergency is fulfilled only within narrow limits of the independent variable. Might it not be shown that when a solution becomes divergent, there exists another which at the same limit becomes convergent, and that where no second form of solution exists none is needed?

In general the linear differential equation

$$f_0(\mathrm{D})u+f_1(\mathrm{D})\epsilon^{x'}u\ldots+f_n(\mathrm{D})\epsilon^{nx'}u=0$$

has as many solutions in ascending series as there are simple factors in $f_0(\mathrm{D})$, and as many descending developments as there are factors of a like nature in $f_n(\mathrm{D})$.

B. § 3. *On the Solution of Linear Partial Differential Equations by Series.*

Let x be one of the independent variables, u the dependent variable, and let the particular object proposed be to develope u in ascending powers of x.

Put $x=\epsilon^{x'}$, and let the equation, supposed to be wanting of a second member, be placed under the form

$$\mathrm{T}_0u+\mathrm{T}_1\epsilon^{x'}u+\mathrm{T}_2\epsilon^{2x'}u\ldots=0, \quad \ldots\ldots\ldots \quad (17.)$$

wherein T_0, T_1, T_2 are rational and entire functions of D and of the remaining variables x', x'', and of the symbols $\frac{d}{dx'}$, $\frac{d}{dx''}$.

Should it then happen that T_0 is of the form $f_0(\mathrm{D})$, not involving x', x''.. $\frac{d}{dx'}$ $\frac{d}{dx''}$, we shall assume

$$f_0(\mathrm{D})u=0,$$

observing to introduce into the solution of this equation arbitrary functions of x', x'', in the stead of arbitrary constants, and proceed with the result as in the cases already illustrated.

Should T_0 involve x', x'', &c., the operations indicated may be of a kind which it is impossible in the present state of analysis to perform. In some such instances they may be evaded by a linear transformation, and in all cases the difficulty will be placed in the true point of view,—no slight advantage of the method.

The theory of equations involving a second member is, *mutatis mutandis*, the same as explained in the preceding section.

Ex. 1. Let the equation be such, that, on assuming $x=\epsilon^y$, we have

$$(\mathrm{D}-a)(\mathrm{D}-b)u+\varphi(y,\frac{d}{dy},\mathrm{D})\epsilon^{ry}u=0.$$

Here, by the fundamental theorem,

$$u=\Sigma u_m\epsilon^{my}=\Sigma u_m x^m,$$

$$(m-a)(m-b)u_m+\varphi(y,\frac{d}{dy},m)u_{m-1}=0.$$

The equation $(m-a)(m-b)=0$ gives $m=a$, $m=b$; and as arbitrary functions are to be written in the place of constants, we shall have

$$u=\mathrm{F}_a(y)x^a+\mathrm{F}_{a+1}(y)x^{a+1}+\mathrm{F}_{(a+2)}(y)x^{a+2}\ldots$$
$$+\mathrm{F}_b(y)x^b+\mathrm{F}_{b+1}(y)x^{b+1}+\mathrm{F}_{b+2}(y)x^{b+2}\ldots$$

where $\mathrm{F}_a(y)$, $\mathrm{F}_b(y)$ are arbitrary, and in general for the rest

$$\mathrm{F}_m(y)=\frac{\phi(y,\frac{d}{dy},m)}{(m-a)(m-b)}\mathrm{F}_{m-1}(y).$$

As a particular example, let $\frac{d^2u}{dx^2}=f(y)\frac{d^2u}{dy^2}$.

Multiply by x^2, and putting $x=\epsilon^y$,

$$\mathrm{D}(\mathrm{D}-1)u-f(y)\frac{d^2}{dy^2}\epsilon^{2y}u=0.$$

$$\therefore\ u=\mathrm{F}_0(y)+\frac{f(y)\frac{d^2}{dy^2}\mathrm{F}_0(y)}{1.2}x^2+\frac{\left\{f(y)\frac{d^2}{dy^2}\right\}^2\mathrm{F}_0(y)}{1.2.3.4}x^4$$
$$+\mathrm{F}_1(y)x+\frac{f(y)\frac{d^2}{dy^2}\mathrm{F}_1(y)}{1.2.3}x^3+\frac{\left\{f(y)\frac{d^2}{dy^2}\right\}^2\mathrm{F}_1(y)}{1.2.3.4.5}x^5,$$

$\mathrm{F}_0(y)\mathrm{F}_1(y)$ being arbitrary. As the operation, implied by the symbol $f(y)\frac{d^2}{dy^2}$, can always be performed, the above solution is universally interpretable.

If $f(y)=a^2$, we get

$$u=\mathrm{F}_0(y)+\frac{a^2}{1.2}\frac{d^2\mathrm{F}_0(y)}{dy^2}x^2+\frac{a^4}{1.2.3.4}\frac{d^4\mathrm{F}_0(y)}{dy^4}x^4$$
$$+\mathrm{F}_1(y)x+\frac{a^2}{1.2.3}\frac{d^2\mathrm{F}_1(y)}{dy^2}x^3+\frac{a^4}{1.2.3.4.5}\frac{d^4\mathrm{F}_1(y)}{dy^4}x^5\ldots$$

Put $\mathrm{F}_0(y)=\varphi(y)+\psi(y)$, $\mathrm{F}_1(y)=u(\varphi'(y)-\psi'(y))$, and substituting, we get

$$u=\varphi(y+ax)+\psi(y-ax),$$

which verifies the solution.

Ex. 2. To integrate the equation $x^2\frac{d^2u}{dx^2}+x\frac{du}{dx}-f(y)\frac{d^2u}{dy^2}=0$.

Putting $x=\epsilon^t$, we have

$$\mathrm{D}^2u-f(y)\frac{d^2}{dy^2}\epsilon^{2y}=0. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (18.)$$

The equation $\mathrm{D}^2u=0$ gives $u=a+\mathrm{B}\theta$, which we shall substitute in (18.), regarding A and B as functions of θ and y. This gives

$$\mathrm{D}^2\mathrm{A}+\theta\mathrm{D}^2\mathrm{B}+2\mathrm{DB}-f(y)\frac{d^2}{dy^2}(\epsilon^{2y}\mathrm{A}+\theta\epsilon^{2y}\mathrm{B})=0,$$

whence by the rule

$$\mathrm{D}^2\mathrm{A}+2\mathrm{DB}-f(y)\frac{d^2}{dy^2}\epsilon^{2y}\mathrm{A}=0,$$

$$\mathrm{D}^2\mathrm{B}-f(y)\frac{d^2}{dy^2}\epsilon^{2y}\mathrm{B}=0,$$

applied to which, the fundamental theorem gives

$$\mathrm{A}=\Sigma a_m\epsilon^{my}, \quad \mathrm{B}=\Sigma b_m\epsilon^{my},$$

$$m^2a_m+2m\,b_m-f(y)\frac{d^2}{dy^2}a_{m-2}=0,$$

$$m^2b_m-f(y)\frac{d^2}{dy^2}b_{m-2}=0\,;$$

whence writing x for ϵ^t, and determining a_m, b_m; observing also that a_0, b_0 will be arbitrary functions of y, we have

$$u=\varphi_0(y)+\varphi_1(y)x+\varphi_2(y)x^2+\&c.$$
$$+\log x(\psi_0(y)+\psi_1(y)x+\psi_2(y)x^2+\&c.),$$

$\varphi_0(y)$, $\varphi_1(y)$ being arbitrary, and the succeeding forms of $\varphi_m(y)$, $\psi_m(y)$ determined by the equations

$$\varphi_m(y)=f(y)\frac{d^2}{dy^2}\frac{m\varphi_{m-2}(y)-2\psi_{m-2}(y)}{m^3}$$

$$\psi_m(y)=f(y)\frac{d^2}{dy^2}\psi_{m-2}(y).$$

Euler has exhibited in a series the integral of the equation

$$\frac{d^2u}{dxdy}+\frac{a}{x+y}\left(\frac{du}{dx}+\frac{du}{dy}\right)+\frac{b}{(x+y)^2}u=0,$$

and on that result are founded many of the solutions of partial differential equations in Dr. Peacock's 'Examples.' We proceed to consider a somewhat more general equation, of which we shall give two distinct solutions.

Ex. 3. Given $\frac{d^2u}{dxdy}+f_1(x+y)\frac{du}{dx}+f_2(x+y)\frac{du}{dy}+f_3(x+y)u=0$,

f_1, f_2, f_3 denoting any functions whatever, to find u.

Put $x=s$, $x+y=t$, then $\frac{d}{dx}=\frac{d}{ds}+\frac{d}{dt}$, $\frac{d}{dy}=\frac{d}{dt}$, and transforming, we have

$$\frac{d^2u}{ds\,dt}+\frac{d^2u}{dt^2}+f_1(t)\frac{du}{ds}+(f_1(t)+f_2(t))\frac{du}{dt}+f_3(t)u=0.$$

Multiply by s, and put $s=\epsilon\frac{d}{dt}$, we have

$$\left(\frac{d}{dt}+f_1(t)\right)\mathrm{D}u+\left(\frac{d^2}{dt^2}+(f_1(t)+f_2(t))\frac{d}{dt}+f_3(t)\right)\epsilon\frac{d}{dt}u=0\,;$$

whence, by the fundamental theorem,

$$u=\Sigma u_m\epsilon^m\frac{d^m}{dt^m}=\Sigma u_m x^m,$$

$$\left(\frac{d}{dt}+f_1(t)\right)mu_m+\left(\frac{d^2}{dt^2}+(f_1(t)+f_2(t))\frac{d}{dt}+f_3(t)\right)u_{m-1}=0.$$

Hence, if for u_m we write $\mathrm{F}_m(t)$, the solution will assume the following form,

$$u=\mathrm{F}_0(t)+\mathrm{F}_1(t)x+\mathrm{F}_2(t)x^2, \quad \ldots\ldots\ldots \quad (19.)$$

where $\mathrm{F}_0(t)$ is arbitrary, and in general

$$\frac{d}{dt}\mathrm{F}_m(t)+f_1(t)\mathrm{F}_m(t)=-\frac{\left(\frac{d^2}{dt^2}+(f_1(t)+f_2(t))\frac{d}{dt}+f_3(t)\right)\mathrm{F}_{m-1}(t)}{m},$$

whence we have, as the law of derivation,

$$\mathrm{F}_m(t)=-\frac{1}{m}\varepsilon^{-\int f_1(t)\,dt}\int\varepsilon^{\int f_1(t)\,dt}\left(\frac{d^2}{dt^2}+(f_1(t)+f_2(t))\frac{d}{dt}+f_3(t)\right)\mathrm{F}_{m-1}(t)\,dt.$$

To this we may add a precisely similar solution in ascending powers of y, the two together constituting the complete integral.

We cannot, from the above, deduce Euler's solution, because that solution is expressed in ascending powers of t, and not of x or y. If, however, for $f_1(t)$, $f_2(t)$, $f_3(t)$ we substitute Euler's forms of those functions, and make $t=\epsilon\frac{d}{dt}$, we shall obtain the result in question.

The general solution (19.) has been given in order to illustrate the fact before adverted to, that when T_0 of (17.) is not simply a function of D, the derivation of the coefficients of the final series may involve operations which it is difficult to perform.

We shall now show how, by a linear transformation, the difficulty may be evaded.

Assume $x-y=s$, $x+y=t$, then $\frac{d}{dx}=\frac{d}{ds}\frac{ds}{dx}+\frac{d}{dt}\frac{dt}{dx}=\frac{d}{ds}+\frac{d}{dt}$,

and $$\frac{d}{dy}=\frac{d}{ds}\frac{ds}{dy}+\frac{d}{dt}\frac{dt}{dy}=\frac{d}{dt}-\frac{d}{ds},$$

and transforming the original equation, we find

$$\frac{d^2u}{ds^2}-\frac{d^2u}{dt^2}-(f_1(t)-f_2(t))\frac{du}{ds}-(f_1(t)+f_2(t))\frac{du}{dt}-f_3(t)u=0.$$

Multiply by s^2 and make $s=\epsilon\frac{d}{dt}$, we have, on reduction,

$$\mathrm{D}(\mathrm{D}-1)u-(f_1(t)-f_2(t))(\mathrm{D}-1)\epsilon\frac{d}{dt}u-\left(\frac{d^2}{dt^2}+(f_1(t)+f_2(t))\frac{d}{dt}+f_3(t)\right)\epsilon^2\frac{d^2}{dt^2}u=0,$$

whence, by the fundamental theorem,

$$u=\Sigma u_m\varepsilon^{mt}=\Sigma u_m s^m,$$

$$m(m-1)u_m-(f_1(t)-f_2(t))(m-1)u_{m-1}-\left(\frac{d^2}{dt^2}+(f_1(t)+f_2(t)\frac{d}{dt}+f_3(t)\right)u_{m-2}=0. \quad (20.)$$

The equation $m(m-1)=0$ gives $m=0$ or 1, whence u_0 and u_1 are arbitrary functions of t, which we shall represent by $F_0(t)$, $F_1(t)$. The value of u_m, which we shall similarly represent by $F_m(t)$, is given by (20.), whence the complete integral will be

$$u=F_0(t)-F_1(t)s+F_2(t)s^2+F_3(t)s^3\ldots \textit{ad inf.},$$

wherein $s=x-y$, $t=x+y$, $F_0(t)$, $F_1(t)$ are arbitrary, and in general

$$F_m(t)=\frac{(m-1)(f_1(t)-f_2(t))F_{m-1}(t)+\left(\frac{d^2}{dt^2}+(f_1(t)+f_2(t))\frac{d}{dt}+f_3(t)\right)F_{m-2}(t)}{m(m-1)}.$$

The derivation of the coefficients is thus always possible.

B. § 4. *On the Integration of Linear Differential Equations in Finite Terms.*

If we affect both sides of the equation

$$f_0(D)u+f_1(D)\varepsilon^t u\ldots+f_n(D)\varepsilon^{nt}u=U$$

with $\{f_0(D)\}^{-1}$, and for $\frac{f_1(D)}{f_0(D)}, \frac{f_2(D)}{f_0(D)}\ldots$ write $\varphi_1(D)$, $\varphi_2(D)\ldots$, and for $\{f_0(D)\}^{-1}U$ write U, we have

$$u+\varphi_1(D)\varepsilon^t u\ldots+\varphi_n(D)\varepsilon^{nt}u=U; \quad \ldots\ldots\ldots \quad (21.)$$

under which form the linear differential equation will be treated in the following investigation.

We however premise the integrability of equations of the form

$$F\left(f(x)\frac{d}{dx}\right)u=U,$$

for, writing $f(x)\frac{d}{dx}=\frac{d}{dt}$, whence $t=\int\frac{dx}{f(x)}$, we have

$$F\left(\frac{d}{dt}\right)u=U,$$

which, for the forms of F here contemplated, is an equation with constant coefficients.

The linear equation of the first order is an example of the above class, for, writing it in the form

$$P\frac{du}{dx}+u=Q,$$

we have only to assume $P\frac{d}{dx}=\frac{d}{dt}$, in order to obtain

$$t=\int\frac{dx}{P}, \quad \frac{du}{dt}+u=Q,$$

$$\therefore \quad u=\varepsilon^{-t}\int\varepsilon^t Q dt=\varepsilon^{-\int\frac{dx}{P}}\int\varepsilon^{\int\frac{dx}{P}}\frac{Q}{P}dx.$$

Equations of the second order comprised in the above general class are of the form

$$\{f(x)\}^2\frac{d^2u}{dx^2}+f(x)(f'(x)+p)\frac{du}{dx}+qu=\mathrm{U}, \quad \ldots\ldots\ldots (22.)$$

as is found by writing $f(x)\frac{d}{dx}=\frac{d}{dt}$ in the equation

$$\frac{d^2u}{dt^2}+p\frac{du}{dt}+qu=\mathrm{U},$$

whence $t=\int\frac{dx}{f(x)}$.

The equation $(1+ax^2)\frac{d^2u}{dx^2}+ax\frac{du}{dx}\pm n^2u=0$ is a particular case of (22.), and its solution is determined by the system

$$t=\int\frac{dx}{\sqrt{1+ax^2}}, \quad \frac{d^2u}{dt^2}\pm n^2u=0.$$

The symbolical form of the equation just considered is

$$u+\frac{a(\mathrm{D}-2)^2\pm n^2}{\mathrm{D}(\mathrm{D}-1)}\varepsilon^{2t}u=0; \quad \ldots\ldots\ldots (23.)$$

to which we shall have occasion to refer.

In the employment of the general symbolical form of the linear differential equation, two principal cases will be considered; the first comprising such equations as are reducible to a system of an inferior order, by a method of resolution similar to that which is employed in the solution of linear differential equations with constant coefficients; the second including those whose solution depends on a transformation affecting the dependent variable u. A more general method of resolution will be explained in the sequel.

Proposition 1.—The equation

$$u+a_1\varphi(\mathrm{D})\varepsilon^t u+a_2\varphi(\mathrm{D})\varphi(\mathrm{D}-1)\varepsilon^{2t}u\ldots+a_n\varphi(\mathrm{D})\varphi(\mathrm{D}-1)..\varphi(\mathrm{D}-n+1)\varepsilon^{nt}u=\mathrm{U}$$

may be resolved into a system of equations of the form

$$u-q\varphi(\mathrm{D})\varepsilon^t u=\mathrm{U},$$

the values of q being determined by the equation

$$q^n+a_1q^{n-1}+a_2q^{n-2}\ldots+a_n=0. \quad \ldots\ldots\ldots (\mathrm{XII.})$$

For

$$\varphi(\mathrm{D})\varphi(\mathrm{D}-1)\varepsilon^{2t}u=\varphi(\mathrm{D})\varepsilon^t\varphi(\mathrm{D})\varepsilon^t u=\{\varphi(\mathrm{D})\varepsilon^t\}^2u,$$

and in general

$$\varphi(\mathrm{D})\varphi(\mathrm{D}-1)..\varphi(\mathrm{D}-n+1)\varepsilon^{nt}u=\{\varphi(\mathrm{D})\varepsilon^t\}^n u;$$

so that if we represent the symbol $\varphi(\mathrm{D})\varepsilon^t$ by ϱ, the equation in question becomes

$$(1+a_1\varrho+a_2\varrho^2\ldots+a_n\varrho^n)u=\mathrm{U};$$

$$\therefore \quad u=(1+a_1\varrho+a_2\varrho^2\ldots+a_n\varrho^n)^{-1}\mathrm{U}$$

$$=\{\mathrm{N}_1(1-q_1\varrho)^{-1}+\mathrm{N}_2(1-q_2\varrho)^{-1}..+\mathrm{N}_n(1-q_n\varrho)^{-1}\}\mathrm{U},$$

provided that q_1, q_2.., q_n are roots of the equation

$$q^n+a_1q^{n-1}+a_2q^{n-2}..+a_n=0,$$

and that N_1, N_2,..N_n are of the forms

$$N_1=\frac{q_1^{n-1}}{(q_1-q_2)(q_1-q_3)..(q_1-q_n)}...N_n=\frac{q_n^{n-1}}{(q_n-q_1)(q_n-q_2)..(q_n-q_{n-1})}.$$

Let $(1-q_1\varepsilon)^{-1}U=u_1$, $(1-q_2\varepsilon)^{-1}U=u_2$, and so on, then

$$u_1-q_1\varepsilon u_1=U, \text{ or } u_1-q_1\varphi(D)\varepsilon^d u_1=U,$$

whence

$$u=N_1u_1+N_2u_2...+N_nu_n, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (24.)$$

wherein $u_1u_2..u_n$ are determined by the system of equations,

$$\left.\begin{aligned} &u_1-q_1\varphi(D)\varepsilon^d u_1=U,\\ &u_2-q_2\varphi(D)\varepsilon^d u_2=U,\\ &\cdots\cdots\cdots\cdots\\ &u_n-q_n\varphi(D)\varepsilon^d u_n=U. \end{aligned}\right\} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (25.)$$

The forms of $\varphi(D)$ which render the above system integrable will hereafter be determined. The most important of these is obviously

$$\varphi(D)=\frac{a_1D+b_1}{aD+b},$$

which reduces the proposed system of equations to the first order.

For the particular form $\varphi(D)=(D)^{-1}$, the equation above considered will represent the general linear differential equation with constant coefficients; for every other form of $\varphi(D)$ it will represent an equation with variable coefficients.

Ex. Let the given equation be $(x^2+mx^{\cdot}+nx^4)\frac{d^2u}{dx^2}$

$$+(2bx+(a+b+2)mx^2+(2a+4)nx^3)\frac{du}{dx}+(b(b-1)+(a+1)bmx+(a+2)(a+1)nx^2)u=0.$$

Putting $x=\varepsilon^d$, and reducing to the symbolical form, we have

$$u+m\frac{D+a}{D+b}\varepsilon^d u+n\frac{(D+a)(D+a-1)}{(D+b)(D+b-1)}\varepsilon^{2d}u=0. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (26.)$$

Here q_1, q_2 are the roots of the equation $q^2+mq+n=0$, whence

$$u=\frac{q_1u_1}{q_1-q_2}+\frac{q_2u_2}{q_2-q_1}=\frac{q_1u_1-q_2u_2}{q_1-q_2},$$

u_1 and u_2 being given by the equations

$$u_1-q_1\frac{D+a}{D+b}\varepsilon^d u_1=0,$$

$$u_2-q_2\frac{D+a}{D+b}\varepsilon^d u_2=0.$$

From the former of these equations we have

$$(\mathrm{D}+b)u_1-q_1(\mathrm{D}+a)\varepsilon^d u_1=0,$$

$$(\mathrm{D}+b)u_1-q_1\varepsilon^d(\mathrm{D}+a+1)u=0,$$

$$\left(x\frac{d}{dx}+b\right)u_1-q_1x\left(x\frac{d}{dx}+a+1\right)u_1=0,$$

$$(x-q_1x^2)\frac{du_1}{dx}+(b-(a+1)q_1x)u_1=0,$$

$$u_1=\frac{c_1}{x^b(1-q_1x)^{a-b+1}},\quad u_2=\frac{c_2}{x^b(1-q_2x)^{a-b+1}},$$

$$\therefore\ u=\frac{c_1(1-q_2x)^{a-b+1}+c_2(1-q_1x)^{a-b+1}}{x^b(1-q_1x)^{a-b+1}(1-q_2x)^{a-b+1}}.$$

The same process would solve the same equation with a second member X.

The next class of equations to be considered comprises those which are integrable by a transformation operating on the dependent variable.

As the theory of the general equation

$$u+\varphi_1(\mathrm{D})\varepsilon^d u+\varphi_2(\mathrm{D})\varepsilon^{2d}u\ \ldots+\varphi_n(\mathrm{D})\varepsilon^{nd}u=\mathrm{U}$$

is deducible from that of the equation

$$u+\varphi(\mathrm{D})\varepsilon^{rd}u=\mathrm{U},$$

we shall first consider the simple case.

Proposition 2.—*The equation* $u+\varphi(\mathrm{D})\varepsilon^{rd}u=\mathrm{U}$ *will be converted into the form* $v+\varphi(\mathrm{D}+n)\varepsilon^{rd}v=\mathrm{V}$, *by the relations*

$$u=\varepsilon^{nd}v,\quad \mathrm{U}=\varepsilon^{nd}\mathrm{V}. \qquad \text{(XIII.)}$$

For assume $u=\varepsilon^{nd}v$, and substituting in the original equation, we have

$$\varepsilon^{nd}v+\varphi(\mathrm{D})\varepsilon^{(n+r)d}v=\mathrm{U},$$

$$\therefore\ \varepsilon^{nd}v+\varepsilon^{nd}\varphi(\mathrm{D}+n)\varepsilon^{rd}v=\mathrm{U},\ \text{by (V.)},$$

$$v+\varphi(\mathrm{D}+n)\varepsilon^{rd}v=\varepsilon^{-nd}\mathrm{U}.$$

Let $\varepsilon^{-nd}\mathrm{U}=\mathrm{V}$, then $\mathrm{U}=\varepsilon^{nd}\mathrm{V}$, and the above becomes

$$v+\varphi(\mathrm{D}+n)\varepsilon^{rd}v=\mathrm{V},$$

as was to be shown.

Proposition 3.—*The equation* $u+\varphi(\mathrm{D})\varepsilon^{rd}u=\mathrm{U}$ *will be converted into the form* $v+\psi(\mathrm{D})\varepsilon^{rd}v=\mathrm{V}$, *by the relations*

$$u=\mathrm{P}_r\frac{\phi(\mathrm{D})}{\psi(\mathrm{D})}v,\quad \mathrm{U}=\mathrm{P}_r\frac{\phi(\mathrm{D})}{\psi(\mathrm{D})}\mathrm{V},$$

wherein $\mathrm{P}_r\frac{\phi(\mathrm{D})}{\psi(\mathrm{D})}$ *denotes the infinite symbolical product* $\frac{\phi(\mathrm{D})\phi(\mathrm{D}-r)\phi(\mathrm{D}-2r)\ldots}{\psi(\mathrm{D})\psi(\mathrm{D}-r)\psi(\mathrm{D}-2r)\ldots}$. . (XIV.)

For assume $u=f(\mathrm{D})v$, and substituting in the original equation, we have

$$f(\mathrm{D})v+\varphi(\mathrm{D})\varepsilon^{rd}f(\mathrm{D})v=\mathrm{U},$$

$$\therefore\ f(\mathrm{D})v+\phi(\mathrm{D})f(\mathrm{D}-r)\varepsilon^{rt}v=\mathrm{U}\text{ by (V.)},$$

$$v+\frac{\phi(\mathrm{D})f(\mathrm{D}-r)}{f(\mathrm{D})}\varepsilon^{rt}v=\{f(\mathrm{D})\}^{-1}\mathrm{U}. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (27.)$$

Comparing this with the equation $v+\psi(\mathrm{D})\varepsilon^{rt}v=\mathrm{V}$, we have

$$\frac{\phi(\mathrm{D})f(\mathrm{D}-r)}{f(\mathrm{D})}=\psi(\mathrm{D}),$$

$$\therefore\ f(\mathrm{D})=\frac{\phi(\mathrm{D})}{\psi(\mathrm{D})}f(\mathrm{D}-r); \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (28.)$$

hence

$$f(\mathrm{D}-r)=\frac{\phi(\mathrm{D}-r)}{\psi(\mathrm{D}-r)}f(\mathrm{D}-2r),$$

and so on, wherefore the value of $f(\mathrm{D})$ will be represented by the infinite product $\frac{\phi(\mathrm{D})\phi(\mathrm{D}-r)\phi(\mathrm{D}-2r)\ldots}{\psi(\mathrm{D})\psi(\mathrm{D}-r)\psi(\mathrm{D}-2r)\ldots}$, which we shall express under the form $\mathrm{P}_{r\frac{\phi(\mathrm{D})}{\psi(\mathrm{D})}}$, in accordance with Sir JOHN HERSCHEL's notation for the integrals of equations of finite differences of the first order, of which, in fact, (28.) is an example. Hence (27.) becomes

$$v+\psi(\mathrm{D})\varepsilon^{rt}v=\mathrm{V},$$

with the relations

$$u=\mathrm{P}_{r\frac{\phi(\mathrm{D})}{\psi(\mathrm{D})}}v, \quad \mathrm{U}=\mathrm{P}_{r\frac{\phi(\mathrm{D})}{\psi(\mathrm{D})}}\mathrm{V}.$$

As the above Proposition is of great importance in the solution of differential equations, we shall devote some attention to the circumstances which attend its application.

That the expression of $\mathrm{P}_{r\frac{\phi(\mathrm{D})}{\psi(\mathrm{D})}}$ may be finite, it is sufficient that for every elementary factor $\chi(\mathrm{D})$ occurring in the numerator, there should correspond a similar factor $\chi(\mathrm{D}\pm ir)$ in the denominator, i being an integer, and *vice versâ*; for

$$\mathrm{P}_{r\frac{\chi(\mathrm{D})}{\chi(\mathrm{D}+ir)}}=\frac{\chi(\mathrm{D})\chi(\mathrm{D}-r)\chi(\mathrm{D}-2r)\ldots}{\chi(\mathrm{D}+ir)\chi(\mathrm{D}+(i-1)r)\ldots}$$

$$=\frac{1}{\chi(\mathrm{D}+ir)\chi(\mathrm{D}+(i-1)r)..\chi(\mathrm{D}+r)},$$

which is a finite expression. Again,

$$\mathrm{P}_{r\frac{\chi(\mathrm{D})}{\chi(\mathrm{D}-ir)}}=\frac{\chi(\mathrm{D})\chi(\mathrm{D}-r)\ldots}{\chi(\mathrm{D}-ir)\chi(\mathrm{D}-(i+1)r)\ldots}$$

$$=\chi(\mathrm{D})\chi(\mathrm{D}-r)..\chi(\mathrm{D}-(i-1)r),$$

which is also finite; the product of any number of such expressions is finite also.

If $\chi(\mathrm{D})$ is any elementary factor of $\phi(\mathrm{D})$, it may be converted into $\chi(\mathrm{D}\pm ir)$; for let $\phi(\mathrm{D})=\chi(\mathrm{D})\chi'(\mathrm{D})$, and let $\psi(\mathrm{D})=\chi(\mathrm{D}\pm ir)\chi'(\mathrm{D})$, wherein $\chi'(\mathrm{D})$ denotes the product of the remaining factors, then

$$\mathrm{P}_{r\frac{\phi(\mathrm{D})}{\psi(\mathrm{D})}}=\mathrm{P}_{r\frac{\chi(\mathrm{D})}{\chi(\mathrm{D}\pm ir)}},$$

which is finite.

If $\varphi(D)$ involves any factor of the form $\frac{\chi(D)}{\chi(D \pm ir)}$, it may be made to disappear; for let $\varphi(D) = \frac{\chi(D)}{\chi(D \pm ir)}\chi'(D)$, and let $\psi(D) = \chi'(D)$, then

$$P_r \frac{\Phi(D)}{\psi(D)} = P_r \frac{\chi(D)}{\chi(D \pm ir)},$$

which is finite.

From inspection of the above it is evident that if $\varphi(D)$ is in the form of a rational fraction, and it is proposed to diminish (so to speak) D in any factor of the numerator, or to augment D in a factor of the denominator, by a multiple of r, the process by which u will be finally deduced from v will depend upon differentiation; but if it is proposed to augment D in a factor of the numerator, or to diminish D in a factor of the denominator, the process will involve integration. The former is obviously the preferable condition.

The general proposition (XIV.) amounts in reality to this, that the equation

$$u + \varphi(D)\varepsilon^{rt}u = U \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (29.)$$

may be resolved into the system of equations,

$$u = P_r \frac{\Phi(D)}{\psi(D)} v, \quad U = P_r \frac{\Phi(D)}{\psi(D)} V, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (30.)$$

$$v + \psi(D)\varepsilon^{rt}v = V, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (31.)$$

whence V, v, u are to be successively determined. Of these equations we shall call the two first the auxiliary ones, and (31.) the transformed one. This premised, the following are the canons which regulate the determination of the constants.

1. If no factor of $\varphi(D)$ disappears in $\psi(D)$, no arbitrary constants are to be introduced into the solutions of the auxiliary equations; those derived from the transformed equation being necessary and sufficient.

2. Disappearing factors are in general of the form $\frac{D+a}{D+b}$, $a-b$ being a multiple of r. Every such factor will give a system of $\frac{a-b}{r}$ constants in the solution of one of the auxiliary equations; if in that of the equation determining V, those constants will be arbitrary, but one only will need to be retained; if however in that of the equation determining u, one only will be arbitrary, and the rest will be therewith connected by the relation $u_m + \varphi(m)u_{m-r} = 0$, derived from the primitive equation.

The reason why the constants connected with the disappearing factor are arbitrary in V alone, is, that V enters into no other equation than the one in whose solution those constants are found. If however the entire series of constants in V are retained, they will be reduced to one by the subsequent differentiations in passing to the value of u.

Ex. 1. To determine the general characteristic of those differential equations of the nth degree, the solution of which depends on that of the equation $\frac{d^n v}{dx^n} \pm q^n v = X$.

The symbolical form of this equation is

$$v \pm \frac{q^n}{\mathrm{D}(\mathrm{D}-1)\,..\,(\mathrm{D}-n+1)} \varepsilon^{n\theta} v = \mathrm{V}, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (32.)$$

wherein V is the symbolical form of $\left(\frac{d}{dx}\right)^{-n} \mathrm{X}$, *i. e.* the result obtained by writing ε^θ for x in the nth integral of $\mathrm{X}dx^n$, no constants being added in the integration. From inspection of (32.), it is evident that the class of equations sought, must, on assuming $x=\varepsilon^\theta$, be reducible to the form

$$u \pm \frac{q^n}{(\mathrm{D}+a_1)(\mathrm{D}+a_2)\,..\,(\mathrm{D}+a_n)} \varepsilon^{n\theta} u = \mathrm{U},$$

in which we shall suppose the quantities $a_1, a_2, \,..\, a_n$ to be ranged in the order of their magnitudes. Put $u=\varepsilon^{-a_1\theta} u$, then by Prop. 2,

$$u_1 \pm \frac{q^n}{\mathrm{D}(\mathrm{D}+a_2-a_1)\,..\,(\mathrm{D}+a_n-a_1)} \varepsilon^{n\theta} u_1 = \varepsilon^{a_1\theta} \mathrm{U}. \quad . \quad . \quad . \quad . \quad . \quad (33.)$$

The first factor of the denominator of $\varphi(\mathrm{D})$ in (32.) now corresponds with the first factor of the denominator of $\psi(\mathrm{D})$ in (33.). In any of the remaining factors we may by Prop. 2 convert D into $\mathrm{D} \pm ir$, i being any integer,—hence that they may all correspond with the factors of $\psi(\mathrm{D})$, we must have the quantities

$$\frac{a_2-a_1+1}{n}, \quad \frac{a_3-a_1+2}{n}, \quad \frac{a_4-a_1+3}{n} \,..\,. \frac{a_n-a_1+n-1}{n},$$

all negative integers, which are therefore the conditions sought.

From (32.) and (33.), by (XIV.),

$$u_1 = \mathrm{P}_n \frac{\phi(\mathrm{D})}{\psi(\mathrm{D})} v,$$

wherein $\varphi(\mathrm{D}) = \pm \frac{q^n}{\mathrm{D}(\mathrm{D}+a_2-a_1)\,..\,(\mathrm{D}+a_n-a_1)}$, $\psi(\mathrm{D}) = \pm \frac{q^n}{\mathrm{D}(\mathrm{D}-1)\,..\,(\mathrm{D}-n+1)}$;

but $u=\varepsilon^{-a_1\theta} u_1$, wherefore

$$u = \varepsilon^{-a_1\theta} \mathrm{P}_n \frac{(\mathrm{D}-1)\,..\,(\mathrm{D}-n+1)}{(\mathrm{D}+a_2-a_1)\,..\,(\mathrm{D}+a_n-a_1)} v, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (34.)$$

whence the value of u will be deduced from that of v by *differentiation*; for since $a_2-a_1<-1$,

$$\mathrm{P}_n \frac{(\mathrm{D}-1)}{(\mathrm{D}+a_2-a_1)} = (\mathrm{D}-1)(\mathrm{D}-n-1)\,..\,(\mathrm{D}+a_2-a_1+n),$$

and so on for the remaining factors to which P_n is to be applied.

The two following examples will sufficiently illustrate the preceding case.

Ex. 2. Given $\frac{d^2u}{dx^2} + q^2 u - \frac{6u}{x^2} = 0$, which is an equation occurring in the theory of the earth's figure.

The symbolical form of this equation is

$$u + \frac{q^2}{(\mathrm{D}+2)(\mathrm{D}-3)} \varepsilon^{2\theta} u = 0.$$

Here $a_1=2$, $a_2=-3$, $n=2$; also the equation for v is $\frac{d^2v}{dx^2}+q^2v=0$, whence

$$v=c\sin(qx+c_1)\text{; and by (34.),}$$

$$u=\varepsilon^{-2\theta}\mathrm{P}_2\frac{\mathrm{D}-1}{\mathrm{D}-5}v,$$

$$=\varepsilon^{-2\theta}(\mathrm{D}-1)(\mathrm{D}-3)v,$$

$$=\frac{1}{x^2}\left(x^2\frac{d^2}{dx^2}-3x\frac{d}{dx}+3\right)c\sin(qx+c_1),$$

$$=c\left\{\left(\frac{3}{x^2}-q^2\right)\sin(qx+c_1)-\frac{3q}{x}\cos(qx+c_1)\right\}.$$

The above example might have been treated directly by Prop. 3, and without the aid of Prop. 2, but the final determination of u would not have then depended on differentiation alone. Thus we should have had

$$u+\frac{q^2}{(\mathrm{D}+2)(\mathrm{D}-3)}\varepsilon^{2\theta}u=0,$$

$$v+\frac{q^2}{\mathrm{D}(\mathrm{D}-1)}\varepsilon^{2\theta}u=\mathrm{V}.$$

Here $\phi(\mathrm{D})=\frac{q^2}{(\mathrm{D}+2)(\mathrm{D}-3)}$, $\psi(\mathrm{D})=\frac{q^2}{\mathrm{D}(\mathrm{D}-1)}$, whence $\mathrm{P}_2\frac{\phi(\mathrm{D})}{\psi(\mathrm{D})}=\mathrm{P}_2\frac{\mathrm{D}(\mathrm{D}-1)}{(\mathrm{D}+2)(\mathrm{D}-3)}=\frac{\mathrm{D}-1}{\mathrm{D}+2}$, wherefore by (30.),

$$u=\frac{\mathrm{D}-1}{\mathrm{D}+2}v, \qquad 0=\frac{\mathrm{D}-1}{\mathrm{D}+2}\mathrm{V}.$$

As no factors disappear in $\psi(\mathrm{D})$, no constants are to be added in determining V, whence $\mathrm{V}=0$, $v=c\sin(qx+c_1)$,

$$u=\frac{\mathrm{D}-1}{\mathrm{D}+2}v=(1-3(\mathrm{D}+2)^{-1})c\sin(qx+c_1),$$

$$=c(1-3\varepsilon^{-2\theta}(\mathrm{D})^{-1}\varepsilon^{2\theta})\sin(qx+c_1),$$

$$=c\left(1-\frac{3}{x^2}\left(x\frac{d}{dx}\right)^{-1}x^2\right)\sin(qx+c_1),$$

$$=c\{\sin(qx+c_1)-\frac{3}{x^2}\int dx x\sin(qx+c_1)\},$$

$$=c\left\{\left(1-\frac{3}{q^2x^2}\right)\sin(qx+c_1)+\frac{3}{qx}\cos(qx+c_1)\right\}.$$

Ex. 3. Given the equation $\frac{d^2u}{dx^2}-\frac{i(i+1)}{x^2}u\pm h^2u=0$, i being a positive integer.

This equation, under a slightly different form, has been discussed by Mossotti in his memoir on Molecular Action. It has also been treated by Paoli and by Plana.

The symbolical form of the equation is

$$u\pm\frac{h^2}{(\mathrm{D}+i)(\mathrm{D}-i-1)}\varepsilon^{2\theta}u=0. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (35.)$$

Comparing this with the general form of Ex. 1, we have

$$a_1=i,\ a_2=-i-1,\ n=2,\ q=h,\ \text{whence}$$

$$u=\varepsilon^{-y}\mathrm{P}_2\frac{\mathrm{D}-1}{\mathrm{D}-2i-1}v,$$

v being determined by the equation $\frac{d^2v}{dx^2}\pm h^2v=0$. Now $\mathrm{P}_2\frac{\mathrm{D}-1}{\mathrm{D}-2i-1}=(\mathrm{D}-1)(\mathrm{D}-3)..$ $(\mathrm{D}-2i+1)$, and writing $x\frac{d}{dx}$ for D, we have

$$u=\frac{1}{x^i}\left(x\frac{d}{dx}-1\right)\left(x\frac{d}{dx}-3\right)..\left(x\frac{d}{dx}-2i+1\right)v. \quad . \quad . \quad . \quad . \quad . \quad (36.)$$

The value of u may be otherwise expressed thus. Applied to any subject, we have

$$\mathrm{D}-1=\varepsilon^{y}\mathrm{D}\varepsilon^{-y}=x\left(x\frac{d}{dx}\right)\frac{1}{x}=x^2\frac{d}{dx}\frac{1}{x},$$

$$\mathrm{D}-3=\varepsilon^{3y}\mathrm{D}\varepsilon^{-3y}=x^4\frac{d}{dx}\frac{1}{x^3},$$

$$\mathrm{D}-2i+1=\varepsilon^{(2i-1)y}\mathrm{D}\varepsilon^{-(2i-1)y}=x^{2i}\frac{d}{dx}x^{-(2i-1)}.$$

Substituting these expressions in the general value of u, viz.

$$u=\varepsilon^{-y}(\mathrm{D}-1)(\mathrm{D}-3)..(\mathrm{D}-2i+1)v,$$

we find

$$u=\frac{1}{x^i}\left(x^2\frac{d}{dx}\right)\frac{1}{x}\left(x^4\frac{d}{dx}\right)\frac{1}{x^3}...\left(x^{2i}\frac{d}{dx}\right)x^{-(2i-1)}v,$$

$$=\frac{1}{x^{i+1}}\left(x^3\frac{d}{dx}\right)\left(x^3\frac{d}{dx}\right)..\left(x^3\frac{d}{dx}\right)\frac{v}{x^{2i-1}},$$

$$=\frac{1}{x^{i+1}}\left(x^3\frac{d}{dx}\right)^i\frac{v}{x^{2i-1}}.$$

Hence the complete integral of the equation $\frac{d^2u}{dx^2}-\frac{i(i+1)}{x^3}u+h^2u=0$ is

$$u=\frac{1}{x^{i+1}}\left(x^3\frac{d}{dx}\right)^i\frac{c\cos(hx)+c_1\sin(hx)}{x^{2i-1}},$$

and that of the equation $\frac{d^2u}{dx^2}-\frac{i(i+1)}{x^3}u-h^2u=0$ is

$$u=\frac{1}{x^{i+1}}\left(x^3\frac{d}{dx}\right)^i\frac{ce^{hx}+c_1e^{-hx}}{x^{2i-1}}, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (37.)$$

which forms are perhaps new.

Equations of the above class have been discussed by Mr. Leslie Ellis, in two very ingenious papers published in the Cambridge Mathematical Journal*, and it is just to observe that the first conceptions of the theory developed in Prop. 3 of this section, were in some degree aided by the study of his researches.

The two following examples are intended to elucidate the theory of disappearing factors.

* Vol. ii. pp. 169, 193.

Ex. 4. Given $(x^2+qx^3)\frac{d^2u}{dx^2}+((a+3)qx^2+(b-i+1)x)\frac{du}{dx}+((a+1)qx-bi)u=X$, the second member representing any function of x, and i being an integer.

The symbolical form of the above equation is

$$u+q\frac{(D+a)D}{(D+b)(D-i)}s^{t}u=U, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (38.)$$

wherein $U=\{(D+b)(D-i)\}^{-1}X$ with the relation $x=s^t$. Assume as the transformed equation,

$$v+q\frac{D+a}{D+b}s^{t}v=V, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (39.)$$

then $P_1\frac{\phi(D)}{\psi(D)}=P_1\frac{D}{D-i}=D(D-1)..(D-i+1)$, wherefore

$$\left.\begin{aligned} u&=(D)(D-1)..(D-i+1)v,\\ U&=(D)(D-1)..(D-i+1)V.\end{aligned}\right\} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (40.)$$

Now (39.) gives

$$(D+b)\ v+qs^{t}(D+a+1)v=(D+b)V,$$

$$x\frac{dv}{dx}+bv+qx(x\frac{d}{dx}+a+1)v=(D+b)V,$$

$$v=\frac{1}{x^b(1+qx)^{a-b+1}}\left\{\int dx\,x^{b-1}(1+qx)^{a-b}(D+b)V+C.\right\} \quad . \quad . \quad . \quad . \quad (41.)$$

Now from (40.) we have

$$V=\{D(D-1)..(D-i+1)\}^{-1}U,$$

$$\therefore\quad (D+b)V=\{D(D-1)..(D-i+1)\}^{-1}(D+b)U.$$

But $(D+b)U=(D-i)^{-1}X$, whence

$$(D+b)V=\{D(D-1)..(D-i)\}^{-1}X.$$

In performing the inverse operation $\{D(D-1)..(D-i+1)\}^{-1}$ we must, by the second canon, retain one arbitrary constant. We choose the one derived from the factor D. Observing then that $\{D(D-1)..(D-i)\}^{-1}=\left\{x^{i+1}\left(\frac{d}{dx}\right)^{i+1}\right\}^{-1}$, we have

$$(D+b)V=\left(\frac{d}{dx}\right)^{-(i+1)}\frac{X}{x^{i+1}}+C.$$

Hence substituting in (41.),

$$v=\frac{\int dx\left\{x^{b-1}(1+qx)^{a-b}\left(\iint..dx^{i+1}\frac{X}{x^{i+1}}+C_1\right)\right\}+C}{x^b(1+qx)^{a-b+1}},$$

$$u=x^i\left(\frac{d}{dx}\right)^i\frac{\int dx\left\{x^{b-1}(1+qx)^{a-b}\left(\iint..dx^{i+1}\frac{X}{x^{i+1}}+C_1\right)\right\}+C}{x^b(1+qx)^{a-b+1}}.$$

If $X=0$, the above gives

$$u=x^i\left(\frac{d}{dx}\right)^i\frac{C+C_1\int dx\,x^{b-1}(1+qx)^{a-b}}{x^b(1+qx)^{a-b+1}}.$$

Ex. 5. Given $(1-x^2)\frac{d^2u}{dx^2}+\left(\frac{p+1}{x}-(4n-p+1)x\right)\frac{du}{dx}-2n(2n-p)u=0$.

This equation has been discussed by Poisson*. I am, however, unacquainted with his results.

Passing to the symbolical form, we have

$$u-\frac{(D+2n-2)(D+2n-2-p)}{D(D+p)}\varepsilon^{2\vartheta}u=0, \quad \ldots\ldots\ldots \quad (42.)$$

which is integrable in three distinct cases.

1st. When p is an odd integer, by assuming as the transformed equation

$$v-\frac{(D+2n-1-p)(D+2n-2-p)}{(D+p)(D+p-1)}\varepsilon^{2\vartheta}v=0,$$

then operating by (XII.).

2nd. When n is an integer, by assuming

$$v-\frac{D+2n-2-p}{D+p}\varepsilon^{2\vartheta}v=V,$$

which is of the first degree.

3rd, When $2n-p$ is an even integer, by assuming

$$v-\varepsilon^{2\vartheta}v=V.$$

An equation similar to the above, and susceptible of an interesting physical application, will be treated at length in another part of this paper.

We are now prepared to assign the general conditions of integrability of the equation $u+\varphi(D)\varepsilon^{r\vartheta}u=U$.

In the first place, if $\varphi(D)$ involves factors of the form $\frac{D+m}{D+n}$, in which $\frac{m-n}{r}$ is an integer, they may be made to disappear as in the two last examples.

Such factors being then rejected, let the remaining factors, if any, in the numerator of $\varphi(D)$ be $(D+m_1)(D+m_2)..(D+m_r)$, and the remaining factors, if any, in the denominator of $\varphi(D)$ be $(D+n_1)(D+n_2)...(D+n_r)$. The conditions required are, that the quantities.

$$\left.\begin{array}{llll} \frac{m_2-m_1+1}{r} & \frac{m_3-m_1+2}{r} & \ldots & \frac{m_r-m_1+r-1}{r} \\ \frac{n_2-n_1+1}{r} & \frac{n_3-n_1+2}{r} & \ldots & \frac{n_r-n_1+r-1}{r} \end{array}\right\} \quad \ldots\ldots\ldots \quad (43.)$$

shall be all integers.

For in such cases the proposed equation can, by (XIV.), be transformed into the following:

$$v+f(D)f(D-1)..(fD-r+1)\varepsilon^{r\vartheta}v=V, \quad \ldots\ldots\ldots \quad (44.)$$

wherein $f(D)$ is equal to $(D+m_1)$, or to $(D+n_1)^{-1}$, or to $\frac{D+m_1}{D+n_1}$, according as the factors of $\varphi(D)$, under consideration, are of the form $(D+m_1)(D+m_2)..(D+m_r)$,

$$\text{or } \frac{1}{(D+n_1)(D+n_2)..(D+n_r)}, \text{ or } \frac{(D+m_1)(D+m_2)..(D+m_r)}{(D+n_1)(D+n_2)..(D+n_r)}.$$

* Journal de l'École Polytechnique, cah. xvii. p. 614.

In each of these cases (44.) is reducible by (XII.) to a system of equations of the first degree.

If for m_1 we choose the *least* of the quantities $m_1\, m_2 \ldots m_r$, and for n_1 the *greatest* of the quantities $n_1\, n_2 \ldots n_r$, the final derivation of u from v will be effected by differentiation.

The only integrable forms of the equation $u+\varphi(\mathrm{D})\varepsilon^{rt}u=\mathrm{U}$, which are not comprised in the above generalisation, are those which finally depend on a transformation affecting the independent variable. They are included, so far as I have been able to ascertain, in the two following general cases, viz.

$$u+a\frac{(\mathrm{D}+m)^2\pm q^2}{(\mathrm{D}+n)(\mathrm{D}+n_1)}\varepsilon^{2t}u=\mathrm{U} \quad \ldots\ldots\ldots (45.)$$

$$u+a\frac{(\mathrm{D}+n)(\mathrm{D}+n_1)}{(\mathrm{D}+m)^2\pm q^2}\varepsilon^{2t}u=\mathrm{U}, \quad \ldots\ldots\ldots (46.)$$

wherein $n-m$ is an even, and n_1-m an odd integer, positive or negative.

If in (46.) we assume $\theta=-t^3$, then multiply by ε^{2t}, and reduce, the result will be of the general form (45.), which alone therefore it will suffice to consider.

By the successive application of Propositions 2 and 3 the equation (45.) may be reduced to the form

$$v+a\frac{(\mathrm{D}-2)^2\pm q^2}{\mathrm{D}(\mathrm{D}-1)}\varepsilon^{2t}v=\mathrm{V};$$

and this equation may always be integrated by putting x in the place of ε^t, and then assuming $\int\frac{dx}{\sqrt{1+ax^2}}=y$, *vide* (23.). A single example will suffice.

Ex. 6. Given $(1-x^2)\frac{d^2u}{dx^2}-(2m+1)x\frac{du}{dx}-(m^2-q^2)u=0$, m being an integer.

The symbolical form is

$$u-\frac{(\mathrm{D}+m-2)^2-q^2}{\mathrm{D}(\mathrm{D}-1)}\varepsilon^{2t}u=0. \quad \ldots\ldots\ldots (47.)$$

Let $u=\varepsilon^{-mt}u_1$, then by (XIII.), Prop. 2,

$$u_1-\frac{(\mathrm{D}-2)^2-q^2}{(\mathrm{D}-m)(\mathrm{D}-m-1)}\varepsilon^{2t}u_1=0.$$

Assume

$$v-\frac{(\mathrm{D}-2)^2-q^2}{\mathrm{D}(\mathrm{D}-1)}\varepsilon^{2t}v=0. \quad \ldots\ldots\ldots (48.)$$

Here $\mathrm{P}_2\frac{\varphi(\mathrm{D})}{\psi(\mathrm{D})}=\mathrm{P}_2\frac{\mathrm{D}(\mathrm{D}-1)}{(\mathrm{D}-m)(\mathrm{D}-m-1)}=\mathrm{D}(\mathrm{D}-1)\ldots(\mathrm{D}-m+1)$, whence

$$u_1=\mathrm{D}(\mathrm{D}-1)\ldots(\mathrm{D}-m+1)v=x^m\left(\frac{d}{dx}\right)^m v.$$

Now (48.) gives $(1-x^2)\frac{d^2v}{dx^2}-x\frac{dv}{dx}+q^2v=0$, which, integrated by the method above explained, leads to $v=c_1\cos(q\sin x^{-1})+c_2\sin(q\sin^{-1}x)$, whence finally,

$$u=\left(\frac{d}{dx}\right)^m\{c_1\cos(q\sin^{-1}x)+c_2\sin(q\sin^{-1}x)\}. \quad \ldots\ldots (49.)$$

By reasoning precisely similar to that of Prop. 3, it may be shown that the equation $u+\varphi_1(\mathrm{D})\varepsilon^{\theta}u \ldots +\varphi_n(\mathrm{D})\varepsilon^{n\theta}u=\mathrm{U}$ may be converted into the form $v+\psi_1(\mathrm{D})\varepsilon^{\theta}v \ldots . +\psi_n(\mathrm{D})\varepsilon^{n\theta}v=\mathrm{V}$, by the assumptions,

$$\left.\begin{aligned} u&=\mathrm{P}_1\frac{\varphi_1(\mathrm{D})}{\psi_1(\mathrm{D})}v=\mathrm{P}_2\frac{\varphi_2(\mathrm{D})}{\psi_2(\mathrm{D})}v \ldots =\mathrm{P}_n\frac{\varphi_n(\mathrm{D})}{\psi_n(\mathrm{D})}v \ldots \\ \mathrm{U}&=\mathrm{P}_1\frac{\Phi_1(\mathrm{D})}{\Psi_1(\mathrm{D})}\mathrm{V} \ldots =\mathrm{P}_n\frac{\Phi_n(\mathrm{D})}{\Psi_n(\mathrm{D})}\mathrm{V}. \end{aligned}\right\} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (\mathrm{XV.})$$

That these assumptions may be realized, it is necessary that $\psi_1(\mathrm{D})$, $\psi_2(\mathrm{D}) \ldots \psi_n(\mathrm{D})$ should be so chosen as to satisfy the conditions,

$$\frac{\varphi_2(\mathrm{D})}{\psi_2(\mathrm{D})}=\frac{\Phi_1(\mathrm{D})\Phi_1(\mathrm{D}-1)}{\psi_1(\mathrm{D})\psi_1(\mathrm{D}-1)},$$

$$\ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots$$

$$\frac{\varphi_n(\mathrm{D})}{\psi_n(\mathrm{D})}=\frac{\Phi_1(\mathrm{D})\Phi_1(\mathrm{D}-1) \ldots \Phi_1(\mathrm{D}-n+1)}{\psi_1(\mathrm{D})\psi_1(\mathrm{D}-1) \ldots \psi_1(\mathrm{D}-n+1)}.$$

These conditions being satisfied, the first of the equations (XV.), viz. $u=\mathrm{P}_1\frac{\Phi_1(\mathrm{D})}{\psi_1(\mathrm{D})}v$, will enable us to deduce u from v.

It is seldom that an application of the above theorem is necessary, and a single example on the present occasion will suffice.

Ex. 7. Given $(a+bx)\frac{d^2u}{dx^2}+(f+gx)\frac{du}{dx}+ngu=0$.

The symbolical form of this equation is

$$u+\frac{b}{a}\frac{\mathrm{D}+\frac{f}{b}-2}{\mathrm{D}}\varepsilon^{\theta}u+\frac{g}{a}\frac{\mathrm{D}+n-2}{\mathrm{D}(\mathrm{D}-1)}\varepsilon^{2\theta}u=0.$$

Assume as the transformed equation,

$$v+\frac{b}{a}\frac{\mathrm{D}+\frac{f}{b}-2}{\mathrm{D}+n-1}\varepsilon^{\theta}v+\frac{g}{a}\frac{1}{\mathrm{D}+n-1}\varepsilon^{2\theta}v=\mathrm{V}.$$

Here we have

$$\mathrm{P}_1\frac{\Phi_1(\mathrm{D})}{\psi_1(\mathrm{D})}=\mathrm{P}_1\frac{\mathrm{D}+n-1}{\mathrm{D}}=(\mathrm{D}+n-1)(\mathrm{D}+n-2)\ldots(\mathrm{D}+1),$$

$$\mathrm{P}_2\frac{\Phi_2(\mathrm{D})}{\psi_2(\mathrm{D})}=\mathrm{P}_2\frac{(\mathrm{D}+n-1)(\mathrm{D}+n-2)}{\mathrm{D}(\mathrm{D}-1)}=(\mathrm{D}+n-1)(\mathrm{D}+n-2)\ldots(\mathrm{D}+1),$$

and these forms are identical. Hence

$$u=(\mathrm{D}+n-1)(\mathrm{D}+n-2)\ldots(\mathrm{D}+1)v=\left(\frac{d}{dx}\right)^{n-1}x^{n-1}v, \quad . \quad . \quad . \quad . \quad (50.)$$

$$0=(\mathrm{D}+n-1)(\mathrm{D}+n-2)\ldots(\mathrm{D}+1)\mathrm{V}. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (51.)$$

As a factor of $\varphi_2(\mathrm{D})$ has disappeared in the transformed equation, it is necessary, by the second canon, to retain an arbitrary constant in the value of V. Now the complete integral of (51.) is $\mathrm{V}=c\varepsilon^{-\theta}+c'\varepsilon^{-2\theta}\ldots+c^{n}\varepsilon^{-(n-1)\theta}$, whereof we shall retain the first term in the second member. Hence

$$v+\frac{b}{a}\frac{\mathrm{D}+\frac{f}{b}-\varrho}{(\mathrm{D}+n-1)}\varepsilon^{t}v+\frac{g}{a}\frac{1}{\mathrm{D}+n-1}\varepsilon^{2t}v=\mathrm{C}\varepsilon^{-t},$$

and putting $\varepsilon^{t}=x$ and reducing,

$$\frac{dv}{dx}+\frac{(n-1)a+(f-b)x+gx^{2}}{ax+bx^{2}}v=\frac{\mathrm{C}}{x^{2}(a+bx)},$$

an equation of the first degree, whence the value of v being determined, that of u is given by (50.).

The methods above developed are also applicable, *mutatis mutandis*, to partial and to simultaneous equations.

C. § 2. *Some Illustrations of a more General Method of Resolution.*

We have, in Propositions 2 and 3 of the last section, fully considered the theory of the differential equation $u+\varphi(\mathrm{D})\varepsilon^{t}u=\mathrm{U}$, and have exhibited in Prop. 1 a method of resolution by which a more extensive class of equations may be reduced to the preceding form. In what follows I purpose to exemplify a more general method of resolution, founded on the expansion of $f(\pi+\varrho)$ in (I.). This method is deserving of particular attention for two reasons; first, because, in connexion with Propositions 2 and 3 already referred to, it enables us to integrate almost every class of linear differential equations that admits of integration in finite terms; and, secondly, because a strictly analogous method is applicable to equations of finite differences.

I shall suppose the differential equation to be placed under the form

$$f_{0}(\mathrm{D})u+f_{1}(\mathrm{D})\varphi(\mathrm{D})\varepsilon^{t}u+f_{2}(\mathrm{D})\varphi(\mathrm{D})\varphi(\mathrm{D}-1)\varepsilon^{2t}u\ldots=\mathrm{U},$$

where $f_{0}(\mathrm{D})$, $f_{1}(\mathrm{D})$, &c. are any rational and entire functions of D, and $\varphi(\mathrm{D})$ any function whatever of that symbol.

Let $\mathrm{D}-n\varphi(\mathrm{D})\varepsilon^{t}=\pi$ and $\varphi(\mathrm{D})\varepsilon^{t}=\varrho$, then by reasoning precisely similar to that of A, Prop. 3, it is seen that π and ϱ combine according to the law,

$$\varrho f(\pi)u=f(\pi-1)\varrho u.$$

Now $\varphi(\mathrm{D})\varepsilon^{t}=\varrho$, $\varphi(\mathrm{D})\varphi(\mathrm{D}-1)\varepsilon^{2t}=\varrho^{2}$, and so on. Wherefore the proposed equation will assume the form

$$f_{0}(\mathrm{D})u+f_{1}(\mathrm{D})\varrho u+f_{2}(\mathrm{D})\varrho^{2}u+\&\mathrm{c.}=\mathrm{U}. \quad . \quad . \quad . \quad . \quad . \quad . \quad (52.)$$

But $\mathrm{D}=\pi+n\varrho$, wherefore, expanding the coefficients of the above equation by (I.), we have

$$f_{0}(\mathrm{D})=f_{0}(\pi)+n\frac{\Delta}{\Delta\pi}f_{0}(\pi)\varrho+\frac{n^{2}}{1.2}\frac{\Delta^{2}}{\Delta\pi^{2}}f_{0}(\pi)\varrho^{2}+\&\mathrm{c.}$$

And similarly for the rest, the interpretation of $\frac{\Delta}{\Delta\pi}$ being

$$\frac{\Delta}{\Delta\pi}f(\pi)=f(\pi)-f(\pi-1).$$

Substituting the expanded forms of f_0 (D) f_1 (D) &c. in (52.), we have a result which may be thus represented:

$$\varphi_0(\pi)u+\varphi_1(\pi)\varrho u+\varphi_2(\pi)\varrho^2+\&c.=U, \quad . \quad . \quad . \quad . \quad . \quad (XVI.)$$

$\varphi_0(\pi)$, $\varphi_1(\pi)$, &c. being rational and entire functions of π. Several distinct cases may here occur, rendering the above equation either integrable, or reducible to a simple form.

1st. It may happen that by a particular determination of n the equation (XVI.) may be reduced to a single term. Suppose that it should give

$$\varphi_0(\pi)u=U;$$

then if $\pi-q_1$, $\pi-q_2$, &c. are the factors of $\varphi_0(\pi)$, we shall, by resolution, have

$$u=N_1u_1+N_2u_2+N_3u_3+\&c.$$
$$(\pi-q_1)u_1=U$$
$$(\pi-q_2)u_2=U.$$

On replacing π by its value, $D-n\varphi(D)\varepsilon^t$, the above system will assume the form

$$u+\varphi_1(D)\varepsilon^t u=U,$$

which has already been considered.

2nd. The coefficients $\varphi_0(\pi)$, $\varphi_1(\pi)$, &c. may be constant. The equation then becomes

$$u+a_1\varrho u+a_2\varrho^2u+\&c.=U,$$

which has been already considered.

3rd. The equation (XVI.) may, perhaps, be reduced to consist of a pair of terms. Suppose that it should give

$$\varphi_0(\pi)u+\varphi_1(\pi)\varrho u=U;$$

this may be reduced to the general form

$$u+\varphi(\pi)\varrho u=U.$$

As π and ϱ combine according to the laws of D and ε^t, the above equation may be treated by Prop. 2 and 3, C. § 1, and its integrable cases determined accordingly.

In illustration of the above theory, we shall investigate the principal integrable cases of the equation

$$(lx^2+mx^3+nx^4)\frac{d^2u}{dx^2}+(l'x+m'x^2+n'x^3)\frac{du}{dx}+(l''+m''x+n''x^2)u=0.$$

The symbolical form of the above equation is

$$\{lD(D-1)+l'D+l''\}u+\{m(D-1)(D-2)+m'(D-1)+m''\}\varepsilon^t u$$
$$+\{n(D-2)(D-3)+n'(D-2)+n''\}\varepsilon^{2t}u=0;$$

or, as it may be written,

$$l(D+\alpha)(D+\beta)u+m(D+\alpha')(D+\beta')\varepsilon^t u+n(D+\alpha'')(D+\beta'')\varepsilon^{2t}u=0, \quad . \quad . \quad (53.)$$

wherein

$$\alpha=\frac{l'-l+\sqrt{(l'-l)^2-4ll''}}{2l},\qquad \beta=\frac{l'-l-\sqrt{(l'-l)^2-4ll''}}{2l},$$

$$\alpha'=\frac{m'-3m+\sqrt{(m'-m)^2-4mm''}}{2m},\quad \beta'=\frac{m'-3m-\sqrt{(m'-m)^2-4mm''}}{2m},$$

$$\alpha''=\frac{n'-5n+\sqrt{(n'-n)^2-4nn''}}{2n},\quad \beta''=\frac{n'-5n-\sqrt{(n'-n)^2-4nn''}}{2n}.$$

It may happen that some of the factors, $D+\alpha$, $D+\beta$, &c., are wanting. This would modify the investigation. We shall, however, here suppose that they are all retained, and shall seek the conditions of integrability under this supposition.

The equation is reducible to the first order, and therefore integrable, if any of the following eight conditions is satisfied:

$$\alpha \text{ or } \beta=\alpha' \text{ or } \beta'=\alpha'' \text{ or } \beta''.$$

Thus if we have $\alpha=\alpha'=\alpha''$, we find

$$l(D+\beta)u+m(D+\beta')\varepsilon^{y}u+n(D+\beta'')\varepsilon^{2y}u=(D+\alpha)^{-1}0=c\varepsilon^{-\alpha y},$$

which is an equation of the first order.

Suppose that we have

$$\left.\begin{aligned}\beta'=\alpha''=\beta''+1,\\ \alpha'=\beta\ =\alpha\ -1.\end{aligned}\right\}\quad\ldots\ldots\ldots\ldots\quad(54.)$$

The equation then becomes

$$l(D+\alpha)(D+\alpha-1)u+m(D+\alpha-1)(D+\beta')\varepsilon^{y}u+n(D+\beta')(D+\beta'-1)\varepsilon^{2y}u=0;$$

or

$$u+\frac{m}{l}\frac{D+\beta'}{D+\alpha}\varepsilon^{y}u+\frac{n}{l}\frac{(D+\beta')(D+\beta'-1)}{(D+\alpha)(D+\alpha-1)}\varepsilon^{2y}u=0,$$

which has already been integrated, Ex. to Prop. 1, C. § 1. There are several other cases in which this method of reduction will apply.

If the conditions (54.) are not both satisfied, let it be supposed that the first is satisfied, we have

$$(D+\alpha)(D+\beta)u+\frac{m}{l}(D+\alpha')(D+\beta')\varepsilon^{y}u+\frac{n}{l}(D+\beta')(D+\beta'-1)\varepsilon^{2y}u=0.$$

Put $(D+\beta')\varepsilon^{y}=\varrho$, $D=\pi+q\varrho$,

then $$(D+\alpha)(D+\beta)u+\frac{m}{l}(D+\alpha')\varrho u+\frac{n}{l}\varrho^2u=0.$$

Expanding the coefficients as directed in the rule, we have

$$(D+\alpha)(D+\beta)=(\pi+\alpha)(\pi+\beta)+q(2\pi+\alpha+\beta-1)\varrho+q^2\varrho^2.\quad\frac{m}{l}(D+\alpha')=\frac{m}{l}(\pi+\alpha'+q\varrho);$$

the substitution of these values will give

$$(\pi+\alpha)(\pi+\beta)u+\left\{\left(2q+\frac{m}{l}\right)\pi+q(\alpha+\beta-1)+\frac{m}{l}\alpha'\right\}\varrho u+\left(q^2+\frac{m}{l}q+\frac{n}{l}\right)\varrho^2u=0;$$

or, as we may for simplicity write,

$$(\pi+\alpha)(\pi+\beta)u+(A\pi+B)\varrho u+C\varrho^2u=0,$$

wherein $A=2q+\frac{m}{l}$, $B=q(\alpha+\beta-1)+\frac{n}{l}\alpha'$, $C=q^2+\frac{m}{l}q+\frac{n}{l}$.

This is integrable in several distinct cases.

1st. Put $C=0$, and taking either value of q, suppose that we have $A=0$, $B=0$, then

$$(\pi+\alpha)(\pi+\beta)u=0,$$

which is reducible to a pair of equations of the first order, and is completely integrable.

2nd. Determine q so as to satisfy the equation $C=0$, then

$$(\pi+\alpha)(\pi+\beta)u+(A\pi+B)\varrho u=0,$$

or

$$u+A\frac{\pi+\frac{B}{A}}{(\pi+\alpha)(\pi+\beta)}\varrho u=0.$$

This is reducible to the first order whenever $\frac{B}{A}$ differs by an integer from α or β.

Thus, suppose that $\frac{B}{A}-\alpha$ is an integer, then assuming

$$v+\frac{A}{\pi+\beta}\varrho u=0,$$

we have

$$u=P_1\frac{\varphi(\pi)}{\psi(\pi)}v,=P_1\frac{\pi+\frac{B}{A}}{\pi+\alpha}v,=\left(\pi+\frac{B}{A}\right)\left(\pi+\frac{B}{A}-1\right)..(\pi+\alpha+1)v.$$

The equation for determining v is of the first order, and the derivation of u from v is effected by processes which involve differentiation only.

3rd. Let $A=0$, and determining q, let $B=0$, then

$$u+\frac{C}{(\pi+\alpha)(\pi+\beta)}\varrho^2u=0.$$

Suppose α greater than β, and assume

$$v+\frac{C}{(\pi+\alpha)(\pi+\alpha-1)}\varrho^2u=0,$$

then

$$u=P_2\frac{\pi+\alpha-1}{\pi+\beta}v=(\pi+\alpha-1)(\pi+\alpha-3)..(\pi+\beta+2)v.$$

Here it is necessary that α and β should differ by an integer. The equation determining v is reducible to a pair of equations of the first order, and u will be found, as in the last example, by differentiation; thus,

$$\begin{aligned}\pi v=(D-q\varrho)v&=\{D-q(D+\beta')\varepsilon^{\theta}\}v,\\&=\{D-q\varepsilon^{\theta}(D+\beta'+1)\}v,\\&=(x-qx^2)\frac{dv}{dx}-q(\beta'+1)xv.\end{aligned}$$

If in the general equation (53.) we assume $\theta=-\theta'$, and multiply by $\varepsilon^{2\theta'}$, we find

$$n(D'-\alpha''-2)(D'-\beta''-2)u+m(D'-\alpha'-2)(D'-\beta'-2)\varepsilon^{\theta'}u+l(D'-\alpha-2)(D'-\beta-2)\varepsilon^{2\theta'}u=0.$$

Let $u=\varepsilon^{2\theta'}v$, then

$$n(\mathrm{D}'-\alpha'')(\mathrm{D}-\beta'')u+m(\mathrm{D}'-\alpha')(\mathrm{D}'-\beta')\varepsilon^{\theta'}u+l(\mathrm{D}'-\alpha)(\mathrm{D}'-\beta)\varepsilon^{2\theta'}u=0,$$

wherein $\mathrm{D}'=\frac{d}{d\theta'}$. The comparison of this equation with (53.) shows that if in the equations of condition which we have obtained, we change α into $-\alpha''$, β into $-\beta''$, l into n, and *vice versâ*, we shall obtain a new series of conditions of integrability. There are probably a few cases which the above analysis would fail to discover. Should the attention of analysts be turned to this subject, it is not unlikely that we shall soon be able to tabulate the forms of $f_0(\mathrm{D}), f_1(\mathrm{D}), f_2(\mathrm{D})$, which render integrable the equation

$$f_0(\mathrm{D})u+f_1(\mathrm{D})\varepsilon^{\theta}u+f_2(\mathrm{D})\varepsilon^{2\theta}u=\mathrm{U},$$

an object which I have endeavoured to accomplish for the case in which the first member involves only two terms.

D. *Theory of Series and of Generating Functions.*

Let $u_px^p+u_{p+1}x^{p+1}\ldots+u_tx^t$ be the proposed series, and let the law of derivation of the coefficients be

$$u_m+\varphi_1(m)u_{m-1}\ldots+\varphi_n(m)u_{m-n}=0, \quad \ldots\ldots\ldots \quad (55.)$$

a law which we shall suppose to obtain for every set of $n+1$ consecutive coefficients of the series. This condition excludes from (55.) all values of m from p to $p+n-1$, and from $t+1$ to $t+n$, *i. e.* the n first values of m in the series, and the n first values of m following those in the series, because for such values of m (55.) ceases to be a relation connecting $n+1$ consecutive coefficients of the series proposed. Now by the fundamental theorem, if $u=\Sigma u_mx^m=\Sigma u_m\varepsilon^{m\theta}$, then

$$u+\varphi_1(\mathrm{D})\varepsilon^{\theta}u..+\varphi_n(\mathrm{D})\varepsilon^{n\theta}u=\Sigma\{(u_m+\varphi_1(m)u^{m-1}..+\varphi_n(m)u^{m-n})\varepsilon^{m\theta}\},$$

but by (55), the expression $u_m+\varphi_1(m)u_{m-1}+$&c. vanishes except for the values of m above particularized, hence to those values alone of m is the summation in the second member to be extended. The result may be expressed in the following theorem.

If $u=\Sigma u_mx^m=\Sigma u_m\varepsilon^{m\theta}$, *and if every* $n+1$ *consecutive coefficients of the series are connected by the relation*

$$u_m+\varphi_1(m)u_{m-1}\ldots+\varphi_n(m)u_{m-n}=0,$$

then

$$u+\varphi_1(\mathrm{D})\varepsilon^{\theta}u..+\varphi_n(\mathrm{D})\varepsilon^{n\theta}u=\Sigma\{(u_m+\varphi_1(m)u_{m-1}..+\varphi_n(m)u_{m-n})\varepsilon^{m\theta}\}, \quad \ldots \quad \text{(XVII.)}$$

the summation Σ *in the second member of the equation extending to the first n values of m in the original series, and to the first n values of m following those which are found in the series, every value of* u_m *being rejected which is not contained in the given series.*

The following are particular deductions from the above theorem.

Let $u=u_px^p+u_{p+r}x^{p+r}+u_{p+2r}x^{p+2r}\ldots+u_tx^t$, and let the law of derivation of the coefficients be $u_m=\varphi(m)u_{m-r}$, then

$$u_m-\varphi(m)u_{m-r}=0, \quad \ldots\ldots\ldots\ldots \quad (56.)$$

$$u-\varphi(\mathrm{D})\varepsilon^{r\theta}u=\Sigma\{u_m-\varphi(m)u_{m-r})\varepsilon^{m\theta}\}.$$

Here the only values of m, whereof account is to be taken, are p and $t+r$. If $m=p$, we have, under the sign of summation, the expression $(u_p-\varphi(p)u_{p-r})\varepsilon^{p\theta}$, but u_{p-r} not being a coefficient of the original series is to be rejected, so that we have simply $u_p\varepsilon^{p\theta}$. Assuming $m=t+r$, we have under Σ the expression $(u_{t+r}-\varphi(t+r)u_t)\varepsilon^{(t+r)\theta}$, from which u_{t+r} being rejected, leaves $-\varphi(t+r)u_t$, wherefore

$$u-\varphi(\mathrm{D})\varepsilon^{r\theta}u=u_p\varepsilon^{p\theta}-\varphi(t+r)u_t\varepsilon^{(t+r)\theta}.$$

Since by (56.), $u_{t+r}-\varphi(t+r)u_t=0$, the above equation may be written under the somewhat simpler form,

$$u-\varphi(\mathrm{D})\varepsilon^{r\theta}u=u_p\varepsilon^{p\theta}-u_{t+r}\varepsilon^{(t+r)\theta}. \quad \ldots\ldots\ldots \quad (57.)$$

If the series is infinite,

$$u-\varphi(\mathrm{D})\varepsilon^{r\theta}u=u_p\varepsilon^{p\theta}. \quad \ldots\ldots\ldots\ldots \quad (58.)$$

Let $u=u_px^p+u_{p+1}x^{p+1}+u_{p+2}x^{p+2}\ldots+u_tx^t$, and let the law of derivation of the coefficients be

$$u_m+\varphi_1(m)u_{m-1}+\varphi_2(m)u_{m-2}=0.$$

Here by the theorem,

$$u+\varphi_1(\mathrm{D})\varepsilon^{\theta}u+\varphi_2(\mathrm{D})\varepsilon^{2\theta}u=\Sigma\{(u_m+\varphi_1(m)u_{m-1}+\varphi_2(m)u_{m-2})\varepsilon^{m\theta}\},$$

the values of m to be considered being p, $p+1$, $t+1$, $t+2$.

Whence the second member gives

$$u_p\varepsilon^{p\theta}+(u_{p+1}+\varphi_1(p+1)u_p)\varepsilon^{(p+1)\theta}+(\varphi_1(t+1)u_t+\varphi_2(t+1)u_{t-1})\varepsilon^{(t+1)\theta}+\varphi_2(t+2)\varepsilon^{(t+2)\theta}.$$

This expression also may be simplified, as in the preceding case, for

$$u_{p+1}+\varphi(p+1)u_p=-\varphi_2(p+1)u_{p-1},$$
$$\varphi_1(t+1)u_t+\varphi_2(t+1)u_{t+1}=-u_{t+1}.$$

Wherefore finally,

$$u+\varphi_1(\mathrm{D})\varepsilon^{\theta}u+\varphi_2(\mathrm{D})\varepsilon^{2\theta}u=u_p\varepsilon^{p\theta}-\varphi_2(p+1)u_{p+1}\varepsilon^{(p+1)\theta}-u_{t+1}\varepsilon^{(t+1)\theta}+\varphi_2(t+2)u_t\varepsilon^{(t+2)\theta}. \quad \ldots \quad (59.)$$

Ex. 1. Let $u=1-\frac{n^2}{1.2}x^2+\frac{n^2(n^2-2^2)}{1.2.3.4}x^4-\frac{n^2(n^2-2^2)(n^2-4^2)}{1.2....6}x^6+\&c.$

Here $u_m=-\frac{n^2-(m-2)^2}{m(m-1)}u_{m-2}$, wherefore by (57.),

$$u-\frac{(\mathrm{D}-2)^2-n^2}{\mathrm{D}(\mathrm{D}-1)}\varepsilon^{2\theta}u=1.$$

$$(1-x^2)\frac{d^2u}{dx^2}-x\frac{du}{dx}+n^2u=0.$$

$$u=c_1\cos(n\sin^{-1}x)+c_2\sin(n\sin^{-1}x).$$

Determining the constants by comparison with the original series, we find $u=\cos(nw)$, wherein w is that value of $\sin^{-1}x$ which lies between $-\frac{\pi}{2}$ and $\frac{\pi}{2}$.

Similarly for the series $x-\frac{n^2-1^2}{1.2.3}x^3+\frac{(n^2-1^2)(n^2-3^2)}{1.2.3.4.5}x^5-\&c.$, we find $u=\frac{1}{n}\sin(nw)$.

The correctness of these results will be shown by substituting Poinsot's expansions.

Ex. 2. To sum the remainder of Taylor's series, viz.

$$\frac{d^n\phi(a)}{da^n}\frac{x^n}{1.2..n}+\frac{d^{n+1}\phi(a)}{da^{n+1}}\frac{x^{n+1}}{1.2..n+1}+\&c.$$

Here $u_m=\frac{1}{m}\frac{d}{da}u_{m-1}$, or $u_m-\frac{1}{m}\frac{d}{da}u_{m-1}=0$, whence

$$u-(\mathrm{D})^{-1}\frac{d}{da}\varepsilon^{\beta}u=\frac{d^n\phi(a)}{da^n}\frac{\varepsilon^{n\beta}}{1.2..n},$$

$$\frac{du}{d\beta}-\frac{d}{da}\varepsilon^{\beta}u=\frac{d^n\phi a}{da^n}\frac{\varepsilon^{n\beta}}{1.2..n-1},$$

$$\frac{du}{dx}-\frac{du}{da}=\frac{d^n\phi(a)}{da^n}\frac{x^{n-1}}{1.2..n-1},$$

a partial differential equation of the first order, of which the complete integral is

$$u=\varepsilon^{x\frac{d}{da}}\left(\int\varepsilon^{-x\frac{d}{da}}\frac{d^n\phi(a)}{da^n}\frac{x^{n-1}dx}{1.2..n-1}+\psi(a)\right),$$

$$=\varepsilon^{x\frac{d}{da}}\int\frac{x^{n-1}dx}{1.2..n-1}\frac{d^n}{da^n}\phi(a-x)+\psi(a+x),$$

ψ denoting an arbitrary function.

Now u vanishes with x whatever may be the value of a, therefore the arbitrary function and the lower limit of the integral are each 0; wherefore

$$u=\varepsilon^{x\frac{d}{da}}\int_0^x dx\frac{x^{n-1}}{1.2..n-1}\frac{d^n\phi(a-x)}{da^n}, \quad \ldots\ldots\ldots\ldots \quad (60.)$$

the symbol $\varepsilon^{x\frac{d}{da}}$ implying that after integration we are to change a into $a+x$.

Series of the class $f(p)x^p+f(p+r)x^{p+r}+f(p+2r)x^{p+2r}+$ &c., wherein $f(m)$ is a function of invariable form, may be reduced to linear equations with constant coefficients.

We have $u=f(p)x^p+f(p+r)x^{p+r}+$ &c. Here $u_m=f(m)$, $u_{m-r}=f(m-r)$, hence $u_m=\frac{f(m)}{f(m-r)}u_{m-r}$, or $u_m-\frac{f(m)}{f(m-r)}u_{m-r}=0$, wherefore

$$u-\frac{f(\mathrm{D})}{f(\mathrm{D}-r)}\varepsilon^{r\beta}u=f(p)\varepsilon^{p\beta}. \quad \ldots\ldots\ldots \quad (61.)$$

Assume $v-\varepsilon^{r\beta}v=\mathrm{V}$, then $\mathrm{P}_r\frac{\phi(\mathrm{D})}{\psi(\mathrm{D})}=\mathrm{P}_r\frac{f(\mathrm{D})}{f(\mathrm{D}-r)}=f(\mathrm{D})$, whence

$$u=f(\mathrm{D})v,$$

$$f(p)\varepsilon^{p\beta}=f(\mathrm{D})\mathrm{V}.$$

The last equation gives $\mathrm{V}=\varepsilon^{p\beta}$, therefore $v=\frac{\varepsilon^{p\beta}}{1-\varepsilon^{r\beta}}$, and

$$u=f(\mathrm{D})\frac{\varepsilon^{p\beta}}{1-\varepsilon^{r\beta}}. \quad \ldots\ldots\ldots\ldots \quad (\mathrm{XVIII.})$$

This remarkable result may be otherwise obtained; thus,

$$u=\Sigma_{m=p}^{m=\infty}f(m)\varepsilon^{m\beta}=\Sigma_{m=p}^{m=\infty}f(\mathrm{D})\varepsilon^{m\beta},$$

$$=f(\mathrm{D})\Sigma_{m=p}^{m=\infty}\varepsilon^{m\beta}=f(\mathrm{D})\frac{\varepsilon^{p\beta}}{1-\varepsilon^{r\beta}}.$$

If we wish to sum a finite portion of the development, let $f(p)x^p$ be the first term of the series as before, and $f(p')x^{p'}$ the first term of the remainder of the series, that is, of the portion following that which is to be reduced to a finite form, then

$$u=f(\mathrm{D})\frac{e^{p\theta}-e^{p'\theta}}{1-e^{r\theta}}. \qquad (62.)$$

Ex. 3. Let $u=1.2..nx+2.3..(n+1)x^2+3.4..(n+2)x^3\ldots+t(t+1)\ldots(t+n-1)x^t$.
Here $f(m)=m(m+1)\ldots(m+n-1)$, therefore

$$u=\mathrm{D}(\mathrm{D}+1)\ldots(\mathrm{D}+n-1)\frac{e^{\theta}-e^{(t+1)\theta}}{1-e^{\theta}},$$

$$=x\frac{d^n}{dx^n}x^{n-1}\frac{x-x^{t+1}}{1-x},$$

$$=x\left(\frac{d}{dx}\right)^n\frac{x^n-x^{t+n}}{1-x}.$$

Ex. 4. Let $u=1^n x+2^n x^2+3^n x^3\ldots+t^n x^t$.
Here $f(m)=m^n$, whence

$$u=\mathrm{D}^n\frac{e^{\theta}-e^{(t+1)\theta}}{1-e^{\theta}}=\left(x\frac{d}{dx}\right)^n\frac{x-x^{t+1}}{1-x}.$$

Ex. 5. Let $u=1+(\cos v)x+(\cos 2v)x^2+$ &c. to t terms.
Here $f(m)=\cos(mv)$, wherefore

$$u=\cos(v\mathrm{D})\frac{1-e^{t\theta}}{1-e^{\theta}},$$

$$=\frac{1}{2}\left(e^{v\mathrm{D}\sqrt{-1}}+e^{-v\mathrm{D}\sqrt{-1}}\right)\frac{1-e^{t\theta}}{1-e^{\theta}},$$

$$=\frac{1}{2}\left(\frac{1-e^{t(\theta+v\sqrt{-1})}}{1-e^{\theta+v\sqrt{-1}}}+\frac{1-e^{t(\theta-v\sqrt{-1})}}{1-e^{\theta-v\sqrt{-1}}}\right),$$

$$=\frac{1-x\cos v-x^t\cos(tv)+x^{t+1}\cos(t-1)v}{1-2x\cos v+x^2}.$$

Ex. 6. Let $u=\frac{4x^3}{1.2.3}+\frac{5x^4}{2.3.4}+\frac{6x^5}{3.4.5}+$ &c., *ad inf.*

Here $f(m)=\frac{m+1}{m(m-1)(m-2)}$, whence

$$u=\frac{\mathrm{D}+1}{\mathrm{D}(\mathrm{D}-1)(\mathrm{D}-2)}\frac{e^{3\theta}}{1-e^{\theta}},$$

$$=\left\{\frac{1}{2}\mathrm{D}^{-1}-2(\mathrm{D}-1)^{-1}+\frac{3}{2}(\mathrm{D}-2)^{-1}\right\}\frac{e^{3\theta}}{1-e^{\theta}},$$

$$=\left\{\frac{1}{2}\mathrm{D}^{-1}-2e^{\theta}\mathrm{D}^{-1}e^{-\theta}+\frac{3}{2}e^{2\theta}\mathrm{D}^{-1}e^{-2\theta}\right\}\frac{e^{3\theta}}{1-e^{\theta}},$$

$$=\frac{1}{2}\int\frac{e^{3\theta}d\theta}{1-e^{\theta}}-2e^{\theta}\int\frac{e^{2\theta}d\theta}{1-e^{\theta}}+\frac{3}{2}e^{2\theta}\int\frac{e^{\theta}d\theta}{1-e^{\theta}},$$

$$=\frac{1}{2}\int\frac{x^3dx}{1-x}-2x\int\frac{xdx}{1-x}+\frac{3}{2}x^2\int\frac{dx}{1-x}.$$

Effecting the integrations, and determining the constants by comparison with the original series, we have

$$u=\frac{7}{4}x^2-\frac{1}{2}x-\left(\frac{1}{2}-2x+\frac{3}{2}x^2\right)\log(1-x).$$

When, as in the above case, the factors of the denominator of $f(m)$ are equidifferent, the value of a may be determined by the solution of an equation of the first order. Thus:

Ex. Let $u=\frac{f(0)}{1.2..n}+\frac{f(1)}{2.3..(n+1)}x+\frac{f(2)}{3.4..(n+2)}x^2+$ &c., *ad inf.*,

wherein $f(m)$ is of the form $a+bm+cm^2+$ &c., being finite and not involving any negative or fractional indices.

Here $$u_m=\frac{f(m)}{(m+1)(m+2)..(m+n)}, \text{ whence}$$

$$u_m-\frac{f(m)}{f(m-1)}\frac{m}{m+n}u_{m-1}=0,$$

$$u-\frac{f(\mathrm{D})}{f(\mathrm{D}-1)}\frac{\mathrm{D}}{\mathrm{D}+n}e^{\theta}u=\frac{f(0)}{1.2..n}.$$

Assume

$$v-\frac{\mathrm{D}}{\mathrm{D}+n}e^{\theta}v=\mathrm{V},$$

we find $u=f(\mathrm{D})v$, $\frac{f(0)}{1.2..n}=f(\mathrm{D})\mathrm{V}$, whence $\mathrm{V}=\frac{1}{1.2..n}$, and substituting

$$v-\frac{\mathrm{D}}{\mathrm{D}+n}e^{\theta}v=\frac{1}{1.2..n},$$

$$(\mathrm{D}+n)v-e^{\theta}(\mathrm{D}+1)v=\frac{1}{1.2..(n-1)}=\frac{1}{\Gamma(n)},$$

$$v=\frac{(1-e^{\theta})^{n-1}}{\Gamma(n)e^{n\theta}}\int\frac{e^{n\theta}d\theta}{(1-e^{\theta})^n},$$

$$u=f(\mathrm{D})\frac{(1-e^{\theta})^{n-1}}{\Gamma(n)e^{n\theta}}\int\frac{e^{n\theta}d\theta}{(1-e^{\theta})^n},$$

$$=\frac{1}{\Gamma(n)}f\left(x\frac{d}{dx}\right)\frac{(1-x)^{n-1}}{x^n}\int_0^x\frac{x^{n-1}dx}{(1-x)^n},$$

a result always finite when n is an integer.

The theorem (XVIII.) may be extended to series involving any number of variables. Let $u=\Sigma f(m_1m_2..)x_1^{m_1}x_2^{m_2}..$, f being a function of invariable form, and the summation Σ extending to all positive integer values of $m_1m_2..$, then

$$u=f(\mathrm{D}_1\mathrm{D}_2..)\frac{1}{(1-e^{\theta_1})(1-e^{\theta_2})}..., \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (63.)$$

wherein $e^{\theta_1}=x_1$, $e^{\theta_2}=x_2$, &c. The performance of the operation $f(\mathrm{D}_1\mathrm{D}_2..)$ will involve differentiation, or the solution of a partial differential equation with constant coefficients.

A still more remarkable theorem is the following.

Let $u=\Sigma f(m_1m_2...m_n)x_1^{m_1}x_2^{m_2}..x_n^{m_n}$, *the summation extending to all positive integer values* (0 *included*) *of* $m_1m_2..m_n$, *which satisfy the condition*

$$m_1+m_2...+m_n=\nu,$$

then if $\varepsilon^{\theta_1}=x_1$, $\varepsilon^{\theta_2}=x_2$, &c.,

$$u=f(D_1.D_2...D_n)\{X_1\varepsilon^{\nu\theta_1}+X_2\varepsilon^{\nu\theta_2}...+X_n\varepsilon^{\nu\theta_n}\}, \quad . \quad . \quad . \quad . \quad . \quad (64.)$$

wherein

$$X_1=\frac{\varepsilon^{(n-1)\theta_1}}{(\varepsilon^{\theta_1}-\varepsilon^{\theta_2})(\varepsilon^{\theta_1}-\varepsilon^{\theta_3})...(\varepsilon^{\theta_1}-\varepsilon^{\theta_n})},$$

$$X_2=\frac{\varepsilon^{(n-1)\theta_2}}{(\varepsilon^{\theta_2}-\varepsilon^{\theta_1})(\varepsilon^{\theta_2}-\varepsilon^{\theta_3})..(\varepsilon^{\theta_2}-\varepsilon^{\theta_n})},$$

and so on for the rest. What is particularly to be noticed is, that the quantities X_1, $X_2..X_n$ are independent of ν.

Lastly, if the condition under which the summation is to be effected is

$$m_1+m_2.. +m_n\leqq\nu,$$

the rest as before, then

$$u=f(D_1, D_2..D_n)\Big\{X_1\frac{1-\varepsilon^{(\nu+1)\theta_1}}{1-\varepsilon^{\theta_1}}+X_2\frac{1-\varepsilon^{(\nu+1)\theta_2}}{1-\varepsilon^{\theta_2}}+\&c.\Big\}. \quad . \quad . \quad . \quad . \quad (65.)$$

As an example, suppose it required to obtain a finite expression for $\Sigma(mnx^my^n)$ subject to the condition

$$m+n=\nu.$$

Here by the theorem,

$$u=D_1D_2\Big\{\frac{\varepsilon^{(\nu+1)\theta_1}}{\varepsilon^{\theta_1}-\varepsilon^{\theta_2}}+\frac{\varepsilon^{(\nu+1)\theta_2}}{\varepsilon^{\theta_2}-\varepsilon^{\theta_1}}\Big\},$$

$$=xy\frac{d^2}{dxdy}\frac{x^{\nu+1}-y^{\nu+1}}{x-y},$$

$$=xy\frac{(\nu-1)(x^{\nu+1}-y^{\nu+1})+(\nu+1)(xy^\nu-x^\nu y)}{(x-y)^3}.$$

Thus let $\nu=3$, we have

$$u=xy\frac{2x^4-4x^3y+4xy^3-2y^4}{(x-y)^3},$$

$$=2x^2y+2xy^2,$$

as it evidently should be.

D. § 2. *On the Theory of Generating Functions as connected with Equations of Differences.*

The complete solution of the equation of differences

$$u_m+\varphi_1(m)u_{m-1}+\varphi_2(m)u_{m-2}...+\varphi_n(m)u_{m-n}=f(m), \quad . \quad . \quad . \quad . \quad (66.)$$

involves n arbitrary constants. This implies that n successive values of u_m may be regarded as indeterminate, the remaining values being thence formed according to the law of which (66.) is the expression. The research of the generating function of u_m implies the finding of a function u, developable in a series, Σu_mx^m, of which the first index p, and the first n coefficients u_p, $u_{p+1}..u_{p+n-1}$ are arbitrary, and the remaining coefficients are formed in subjection to the law (66.).

In what follows we shall suppose that the first index p is 0, and that the n arbitrary coefficients of the development of u corresponding to the n arbitrary constants in the solution of the equation of differences, are $u_0, u_1..u_{n-1}$.

Let $f(m)=t_m$, then

$$u_m+\varphi_1(m)u_{m-1}...+\varphi_n(m)u_{m-n}-t_m=0.$$

Let also t be the generating function of t_m, as is u of u_m, so that

$$u=\Sigma_{m=0}^{m=\infty}(u_m s^{m\theta}).t=\Sigma_{m=0}^{m=\infty}(t_m s^{m\theta}).$$

By the fundamental theorem of development,

$$u+\varphi_1(\mathrm{D})s^{\theta}u..+\varphi_n(\mathrm{D})s^{n\theta}u-v=\Sigma\{(u_m+\varphi_1(m)u_{m-1}...+\varphi_n(m)u_{m-n}-t_m)s^{m\theta}\}.$$

Now considering the expression in the second member under the sign Σ, let $m=0$, and it becomes u_0-t_0, for which as u_0 is arbitrary, we may write c_0, an arbitrary constant. Secondly, let $m=1$, we have $(u_1+\varphi_0(1)u_0-t_1)s^{\theta}=c_1s^{\theta}$, since u_1 is arbitrary. In like manner may we proceed till we arrive at the assumption $m=n-1$, which gives the term $c_{n-1}s^{(n-1)\theta}$. For all values of m greater than $n-1$, the expression under Σ vanishes by (66.), wherefore

$$u+\varphi_1(\mathrm{D})s^{\theta}u...+\varphi_n(\mathrm{D})s^{n\theta}u-t=c_0+c_1s^{\theta}..+c_{n-1}s^{(n-1)\theta};$$

or replacing t by its value, and transposing to the second member,

$$u+\varphi_1(\mathrm{D})s^{\theta}u..+\varphi_n(\mathrm{D})s^{n\theta}u=\Sigma_{m=0}^{m=\infty}f(m)s^{m\theta}+c_0+c_1s^{\theta}..+c_{n-1}s^{(n-1)\theta}. \quad . \quad . \quad . \quad \text{(XIX.)}$$

Ex. 1. Given $u_m+a_1\frac{m-n-1}{m}u_{m-1}+a_2\frac{m-2n-2}{m}u_{m-2}=f(m)$ to find the generating function of u_m.

Here by the theorem

$$u+a_1\frac{\mathrm{D}-n-1}{\mathrm{D}}s^{\theta}u+a_2\frac{\mathrm{D}-2n-2}{\mathrm{D}}s^{2\theta}u=t+c_0+c_1s^{\theta}, \quad . \quad . \quad . \quad . \quad . \quad (67.)$$

wherein $t=\Sigma_{m=0}^{m=\infty}f(m)s^{m\theta}$. Hence

$$\mathrm{D}u+a_1s^{\theta}(\mathrm{D}-n)u+a_2s^{2\theta}(\mathrm{D}-2n)u=\frac{dt}{d\theta}+c_1s^{\theta},$$

$$\frac{du}{dx}-n\frac{a_1+2a_2x}{1+a_1x+a_2x^2}u=\frac{\frac{dt}{dx}+c_1}{1+a_1x+a_2x^2},$$

$$u=(1+a_1x+a_2x^2)^n\left\{\int\frac{\left(\frac{dt}{dx}+c_1\right)dx}{(1+a_1x+a_2x^2)^{n+1}}+c\right\}. \quad . \quad . \quad . \quad . \quad . \quad (68.)$$

The value of t will of course be found by the preceding chapter. Suppose as a particular illustration that $f(m)=\frac{1}{1.2..m}$, then $t=s^x$, whence

$$u=(1+a_1x+a_2x^2)^n\left\{\int dx\frac{s^x+\mathrm{C}_1}{(1+a_1x+a_2x^2)^n}+\mathrm{C}\right\}.$$

Let $f(m)=0$, and further, let $\mathrm{C}_1=0$, then

$$u=c(1+a_1x+a_2x^2)^n;$$

this value of u involving but one arbitrary constant, the coefficient of the first term only of its development will be arbitrary, and the rest will be formed in subjection to the law proposed.

Ex. 2. Let the equation be $u_m+\frac{f(m)}{f(m-1)}\frac{a_1m+b_1}{am+b}u_{m-1}+\frac{f(m)}{f(m-2)}\frac{a_2m+b_2}{am+b}u_{m-2}=\mathrm{F}(m)$.

By the theorem we have

$$u+\frac{f(\mathrm{D})}{f(\mathrm{D}-1)}\frac{a_1\mathrm{D}+b_1}{a\mathrm{D}+b}\varepsilon^{\theta}u+\frac{f(\mathrm{D})}{f(\mathrm{D}-2)}\frac{a_2\mathrm{D}+b_2}{a\mathrm{D}+b}\varepsilon^{2\theta}u=\Sigma_{m=0}^{m=\infty}\mathrm{F}(m)\varepsilon^{m\theta}+c_0+c_1\varepsilon^{\theta}.$$

Assume $$v+\frac{a_1\mathrm{D}+b_1}{a\mathrm{D}+b}\varepsilon^{\theta}v+\frac{a_2\mathrm{D}+b_2}{a\mathrm{D}+b}\varepsilon^{2\theta}v=\mathrm{V}.$$

Here $\mathrm{P}_1\frac{f(\mathrm{D})}{f(\mathrm{D}-1)}=\mathrm{P}_2\frac{f(\mathrm{D})}{f(\mathrm{D}-2)}=f(\mathrm{D})$, whence observing that $\frac{c_0}{f(0)}$, $\frac{c_1}{f(1)}$ are still arbitrary,

$$u=f(\mathrm{D})v,$$

$$v+\frac{a_1\mathrm{D}+b_1}{a\mathrm{D}+b}\varepsilon^{\theta}v+\frac{a_2\mathrm{D}+b_2}{a\mathrm{D}+b}\varepsilon^{2\theta}u=\Sigma_{m=0}^{m=\infty}\frac{\mathrm{F}(m)}{f(m)}\varepsilon^{m\theta}+c_0+c_1\varepsilon^{\theta}.$$

From the second of these equations, which is linear, and of the first order, the complete value of v will be found, whence that of u will be obtained by differentiation, or by the solution of a differential equation with constant coefficients, according as the form of $f(\mathrm{D})$ may determine.

D. § 3. *On the Theory of Generating Functions as connected with Equations of Partial Differences.*

We shall confine our observations on this subject to the case of equations involving two independent variables, the most general form of such equations being

$$\left.\begin{array}{llll}\varphi_0(mn)u_{m,n} & +\varphi_1(mn)u_{m-1,n} & +\varphi_2(mn)u_{m-2,n}\ldots & \\ +\psi_0(mn)u_{m,n-1}+\psi_1(mn)u_{m-1,n-1}+\psi_2(mn)u_{m-2,n-1}\ldots & & & \\ +\chi_0(mn)u_{m,n-2}+\chi_1(mn)u_{m-1,n-2}+\chi_2(mn)u_{m-2,n-2}\ldots & & & \end{array}\right\}=f(mn).$$

The above equation may be placed under the form

$$\Sigma\varphi(mn)u_{m-r,n-r^1}=f(mn), \quad \ldots\ldots\ldots \quad (69.)$$

the forms of $\varphi(mn)$, and the value of r and r^1, being different in different terms of the equation, the greatest difference of the values of r we shall represent by i, and the greatest difference of the values of r^1 by i^1.

Let u be the generating function of u_{mn}, its development $\Sigma(u_{mn}x^my^n)$ being arranged in ascending positive powers of the variables, the lowest index of each being 0. By reasoning similar to that employed in the preceding chapter, it may be shown that the equation for determining the value of u will be

$$\begin{aligned}\Sigma\{\varphi(\mathrm{D},\mathrm{D}^1,)\varepsilon^{r\theta+r^1\theta^1}u\}=&\Sigma\{f(mn)\varepsilon^{m\theta+n\theta^1}\}\\ &+\Phi_0(\varepsilon^{\theta})+\Phi_1(\varepsilon^{\theta^1})\varepsilon^{\theta}\ldots+\Phi_{i-1}(\varepsilon^{\theta^1})\varepsilon^{(i-1)\theta}\\ &+\Psi_0(\varepsilon^{\theta})+\Psi_1(\varepsilon^{\theta})\varepsilon^{\theta^1}\ldots+\Psi_{i-1}(\varepsilon^{\theta})\varepsilon^{(i-1)\theta^1}, \quad \ldots \quad (\mathrm{XX.})\end{aligned}$$

wherein $\varepsilon'=x$, $\varepsilon''=y$. The summation Σ in the second member extends from $m=0$ to $m=\infty$, and from $n=0$ to $n=\infty$. The functions $\Phi_0(\varepsilon'')$, $\Phi_0(\varepsilon')$, &c. are in general, but not always, arbitrary and independent. Their forms are in each particular instance to be determined by the initial conditions of the problem.

Ex. 1. Let the proposed equation be $u_{m,n}-2u_{m,n-1}-2u_{m-1,n-1}=0$.

This is one of LAPLACE's examples. Applying the theorem, we have

$$u-2\varepsilon''u-2\varepsilon'+\varepsilon''u=\Phi_0(\varepsilon'')+\Psi_0(\varepsilon'), \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (70.)$$

$$u=\frac{\Phi_0(y)+\Psi_0(x)}{1-2y-2xy}. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (71.)$$

To show in what way the arbitrary functions are to be determined, let it be supposed that when $y=0$, $u=f(x)$, a known function, and when $x=0$, $u=f(y)$, a known function also, then in (71.) making successively $x=0$, $y=0$, and x and y together $=0$, we have

$$\frac{\Phi_0(y)+\Psi_0(0)}{1-2y}=f_1(y), \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (72.)$$

$$\Phi_0(0)+\Psi_0(x)=f(x), \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (73.)$$

$$\Phi_0(0)+\Psi_0(0)=f(0), \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (74.)$$

(72.)$\times(1-2y)+$(73.)$-$(74.) gives $\Phi_0(y)+\Psi_0(x)=f(x)+(1-2y)f_1(y)-f(0)$, whence

$$u=\frac{f(x)+(1-2y)f_1(y)-f(0)}{1-2y-2xy}.$$

Ex. 2. Let $u_{m,n}+a_1\frac{m}{m+1}u_{m-1,n}+a_2u_{m,n-1}+b\frac{m}{m+1}u_{m-1,n-1}=\frac{1}{1.2..m.1.2..n}$.

Here, by the theorem,

$$u+a_1\frac{\mathrm{D}}{\mathrm{D}+1}\varepsilon'u+a_2\varepsilon''u+b\frac{\mathrm{D}}{\mathrm{D}+1}\varepsilon'+\varepsilon''u=\varepsilon^{\varepsilon'+\varepsilon''}+\Phi(\varepsilon'')+\Psi(\varepsilon').$$

Assume $\quad v+a_1\varepsilon'v+a_2\varepsilon''v+b\varepsilon'+\varepsilon''v=\mathrm{V}$, then $\mathrm{P}_1\frac{\mathrm{D}}{\mathrm{D}+1}=\frac{1}{\mathrm{D}+1}$,

whence $\quad u=(\mathrm{D}+1)^{-1}v=\varepsilon^{-t}(\mathrm{D})^{-1}\varepsilon'v=\frac{1}{x}\int v dx$, also $\mathrm{V}=(\mathrm{D}+1)\mathrm{U}$

$$=\left(x\frac{d}{dx}+1\right)(\varepsilon^{x+y}+\Phi(y)+\Psi(x))=(x+1)\varepsilon^{x+y}+\mathrm{F}(x)+\mathrm{F}_1(y),$$

the functions $\mathrm{F}(x)$ and $\mathrm{F}_1(y)$ being arbitrary. Hence the equation determining v becomes

$$v+a_1xv+a_2yv+bxyv=(x+1)\varepsilon^{x+y}+\mathrm{F}(x)+\mathrm{F}_1(y),$$

$$\therefore \quad v=\frac{(x+1)\varepsilon^{x+y}+\mathrm{F}(x)+\mathrm{F}_1(y)}{1+a_1x+a_2y+bxy},$$

$$u=\frac{1}{x}\int dx\frac{(x+1)\varepsilon^{x+y}+\mathrm{F}(x)+\mathrm{F}_1(y)}{1+a_1x+a_2y+bxy}. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (75.)$$

Had the second member of the original equation been 0, we should have had

$$u=\frac{1}{x}\int dx\frac{\mathrm{F}(x)+\mathrm{F}_1(y)}{1+a_1x+a_2y+bxy}. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (76.)$$

Suppose it here, as before, required to determine the arbitrary functions by the

conditions that $x=0$, $y=0$ shall respectively give $u=f(x)$, and $u=f_1(y)$; differentiating (76.) and proceeding as before, we find

$$u=\frac{1}{x}\int dx\frac{(1+a_1x)\left(x\frac{d}{dx}+1\right)f(x)+(1+a_2y)f_1(y)-f(0)}{1+a_1x+a_2y+bxy}.$$

The general theorem (XX.) applied in the two preceding examples is formed on the condition that the generating function u shall involve in its development positive powers only of x and y. This condition introduces into the second member a greater number of arbitrary functions than would otherwise be necessary. If, for example, it were merely required that the indices of y in the development should be positive and ascending, the form of the second member of (XX.) would simply be

$$\Sigma f(mn)\varepsilon^{m\theta+n\theta'}+\psi_0(\varepsilon^{\theta'})+\psi_1(\varepsilon^{\theta'})\varepsilon^{\theta'}..+\psi_{r-1}(\varepsilon^{\theta'})\varepsilon^{r\theta'}.$$

Which of the two assumptions is preferable or necessary must be determined by special considerations.

As an example of the latter form, let us take the very simple equation

$$m(m-1)u_{m,n-2}-a^2n(n-1)u_{m-2,n}=0.$$

We have

$$\mathrm{D}(\mathrm{D}-1)\varepsilon^{2\theta'}u-a^2\mathrm{D}'(\mathrm{D}'-1)\varepsilon^{2\theta}u=\mathrm{F}_0(\varepsilon^{\theta'})+\mathrm{F}_1(\varepsilon^{\theta'})\varepsilon^{\theta'},$$

$$\therefore\frac{d^2u}{dx^2}-a^2\frac{d^2u}{dy^2}=\frac{\mathrm{F}_0(x)+\mathrm{F}_1(x)y}{x^2y^2}.$$

The solution of this equation will put us in possession of the complete value of u, the functions $\mathrm{F}_0(x)$, $\mathrm{F}_1(x)$ admitting of either positive or negative indices in their developments. If we assume those functions to vanish, we get

$$u=\varphi(y+ax)+\psi(y-ax),$$

which is a particular value of the generating function.

Many other developments and applications might be here given, were the subject of sufficient importance to justify further detail.

E. *Application of the Theory of Series to the Evaluation of certain Definite Integrals.*

Ex. 1. The function $(1-2r\cos\omega+r^2)^{-n}$ being expanded in a series of the form

$$\mathrm{A}_0+2(\mathrm{A}_1\cos\omega+\mathrm{A}_2\cos 2\omega+\mathrm{A}_3\cos 3\omega+\&c.),$$

it is required to determine the general coefficient A_r.

We have

$$(1-2r\cos\omega+r^2)^{-n}=(1-re^{\omega\sqrt{-1}})^{-n}\times(1-re^{-\omega\sqrt{-1}})^{-n},$$

$$=\left(1+nre^{\omega\sqrt{-1}}+\frac{n(n+1)}{1.2}r^2e^{2\omega\sqrt{-1}}+\frac{n(n+1)(n+2)}{1.2.3}r^3e^{3\omega\sqrt{-1}}+\&c.\right)$$

$$\times\left(1+nre^{-\omega\sqrt{-1}}+\frac{n(n+1)}{1.2}r^2e^{-2\omega\sqrt{-1}}+\frac{n(n+1)(n+2)}{1.2.3}r^3e^{-3\omega\sqrt{-1}}+\&c.\right),$$

and the quantity sought, A_r, will be the common coefficient of $e^{r\omega\sqrt{-1}}$ and $e^{-r\omega\sqrt{-1}}$ in

the above product. Hence

$$A_r=1\times\frac{n(n+1)..(n+r-1)}{1.2..r}v^r+\frac{n}{1}\times\frac{n(n+1)..(n+r)}{1.2..r+1}v^{r+2}$$

$$+\frac{n(n+1}{1.2}\times\frac{n(n+1)..(n+r+1)}{1.2..r+2}v^{r+4}+\&c.\ \textit{ad infinitum}.$$

Put $v^2=t$, then

$$A_r=t^{\frac{r}{2}}\Sigma_{m=0}^{m=\infty}(u_m t^m), \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (77.)$$

wherein generally $u_m=\frac{n(n+1)..(n+m-1)}{1.2..m}\times\frac{n(n+1)..(n+r+m-1)}{1.2..(r+m)}$,

the law of derivation being

$$u_m-\frac{(n+m-1)(n+r+m-1)}{m(m+r)}u_{m-1}=0.$$

Hence, if $\Sigma u_m t^m=u$, and if $t=s^t$, then

$$u-\frac{(D+n-1)(D+r+n-1)}{D(D+r)}s^t u=\frac{n(n+1)..(n+r-1)}{1.2..r}=U. \quad . \quad . \quad . \quad . \quad (78.)$$

To integrate this equation, assume

$$v-s^t v=V.$$

Then $$u=P_1\frac{(D+n-1)(D+r+n-1)}{D(D+r)}v,$$

$$=(D+n-1)(D+n-2)..(D+1).(D+r+n-1)..(D+r+1)v,$$

$$U=(D+n-1)(D+n-2)..(D+1).(D+r+n-1)..(D+r+1)V.$$

Hence determining V, we have

$$v-s^t v=\frac{n(n+1)..(n+r-1)}{1.2..r}\times\frac{1}{1.2..(n-1).(r+1)(r+2)..(r+n-1)},$$

$$=\frac{1}{\{1.2..(n-1)\}^2}=\frac{1}{\{\Gamma(n)\}^2},$$

$$\therefore\ v=\frac{1}{\{\Gamma(n)\}^2(1-s^t)}.$$

Now $$u=(D+r+n-1)..(D+r+1).(D+n-1)..(D+1)v,$$

but $$(D+r+n-1)..(D+r+1)=t^{-r}\left(\frac{d}{dt}\right)^{n-1}t^{r+n-1},$$

and $$(D+n-1)..(D+1)=\left(\frac{d}{dt}\right)^{n-1}t^{n-1},$$

hence $$u=t^{-r}\left(\frac{d}{dt}\right)^{n-1}t^{r+n-1}\left(\frac{d}{dt}\right)^{n-1}\frac{t^{n-1}}{\{\Gamma(n)\}^2(1-t)}.$$

But $$\left(\frac{d}{dt}\right)^{n-1}\frac{t^{n-1}}{1-t}=\left(\frac{d}{dt}\right)^{n-1}\frac{1}{1-t}$$ (this may be shown by expansion)

$$=\frac{1.2..n-1}{(1-t)^n}=\frac{\Gamma(n)}{(1-t)^n},$$

therefore $$u=t^{-r}\left(\frac{d}{dt}\right)^{n-1}\frac{t^{r+n-1}}{\Gamma(n)(1-t)^n},$$

and $$A_r=\frac{1}{\Gamma(n)t^{\frac{r}{2}}}\left(\frac{d}{dt}\right)^{n-1}\frac{t^{r+n-1}}{(1-t)^n} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (79.)$$

wherein $t=v^2$, a formula of great simplicity.

Hence then we find

$$\int_0^\pi \frac{dx\cos rx}{(1-2v\cos x+v^2)^n}=\frac{\pi}{\Gamma(n)t^{\frac{r}{2}}}\left(\frac{d}{dt}\right)^{n-1}\frac{t^{r+n-1}}{(1-t)^n}. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (80.)$$

Legendre has, I believe, considered the above definite integral, but I am not acquainted with the results of his analysis.

The following expression for the value V of the definite integral

$$\int_0^\pi \frac{dx\cos rx}{(1-2v_1\cos x+v_1^2)^l(1-2v_2\cos x+v_2^2)^m\ldots\varrho \text{ factors}}$$

is remarkable for its symmetry,

$$V=\frac{\pi}{\Gamma(l)\Gamma(m)\ldots}\left(\frac{d}{dt_1}\right)^{l-1}\left(\frac{d}{dt_2}\right)^{m-1}\frac{t_1^{l-1}t_2^{m-1}\ldots}{\ldots(1-t_1)^l(1-t_2)^m\ldots}\left\{T_1\left(\frac{t_1}{v_1}\right)^{r+\varrho-1}+T_2\left(\frac{t_2}{v^2}\right)^{r+\varrho-1}+\&c.\right\} \quad (81.)$$

wherein, after effecting the differentiations, we must change t_1 into v_1^2, t_2 into v_2^2, &c., observing that

$$T_1=\frac{\left\{1-\left(\frac{t_2}{v_2}\right)^2\right\}\left\{1-\left(\frac{t_3}{v_3}\right)^2\right\}\ldots\left\{1-\left(\frac{t_\varrho}{v_\varrho}\right)^2\right\}}{\left(\frac{t_1}{v_1}-\frac{t_2}{v_2}\right)\left(\frac{t_1}{v_1}-\frac{t_3}{v_3}\right)\ldots\left(\frac{t_1}{v_1}-\frac{t_\varrho}{v_\varrho}\right)};$$

and so on for the rest.

Ex. 2. To express by a partial differential equation the fundamental properties of the definite multiple integral

$$u=\iint\ldots dx_1dx_2\ldots dx_n\varphi(a_1-x_1,\ a_2-x_2\ldots a_n-x_n) \quad . \quad . \quad . \quad . \quad . \quad . \quad (82.)$$

the integrations extending to all real values of $x_1x_2\ldots x_n$, subject to the inequality

$$\frac{x_1^2}{h_1^2}+\frac{x_2^2}{h_2^2}\ldots+\frac{x_n^2}{h_n^2}<1.$$

We may consider the above integral as derived from the more general one,

$$u=\iint\ldots dx_1dx_2\ldots dx_n\varphi(a_1-x_1t,\ a_2-x_2t\ldots a_n-x_nt),$$

by the assumption $t=1$. If we expand $\varphi(a_1-x_1t,\ a_2-x_2t\ldots a_n-x_nt)$ in ascending powers of t, and integrate within the proposed limits by the aid of Dirichlet's theorem, we find

$$u=\frac{2h_1h_2\ldots h_n\pi^{\frac{n}{2}}}{\Gamma\left(\frac{n}{2}\right)}\sum_{p=0}^{p=\infty}\frac{1}{2.4\ldots2p.n(n+2)\ldots(n+2p)}\lambda^{2p}t^{2p}\varphi(a_1a_2\ldots a_n), \quad . \quad . \quad . \quad . \quad (83.)$$

wherein $$\lambda^2=h_1^2\frac{d^2}{da_1^2}+h_2^2\frac{d^2}{da_2^2}+h_n^2\frac{d^2}{da_n^2}*.$$

* Cambridge Mathematical Journal, No. XIV. p. 69.

If we write the above series in the form $u=\Sigma u_m t'^m$, then it is easily seen that

$$u_m-\frac{1}{m(m+n)}\lambda^2 u_{m-2}=0.$$

Hence, if $t=t'$,

$$u-\frac{\lambda^2}{\mathrm{D}(\mathrm{D}+n)}t^2 u=\frac{2h_1h_2..h_n\pi^{\frac{n}{2}}}{n\Gamma\left(\frac{n}{2}\right)}, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (84.)$$

$$\therefore \quad \mathrm{D}(\mathrm{D}+n)u-\lambda^2 t^2 u=0.$$

Restoring t, and for λ^2 writing

$$h_1^2\frac{d^2}{da_1^2}+h_2^2\frac{d^2}{da_2^2}..+h_n^2\frac{d^2}{da_n^2},$$

and then dividing the result by t^2, we have

$$\frac{d^2u}{dt^2}+\frac{n+1}{t}\frac{du}{dt}-h_1^2\frac{d^2u}{da_1^2}-h_2^2\frac{d^2u}{da_2^2}\cdots-h_n^2\frac{d^2u}{da_n^2}=0, \quad . \quad . \quad . \quad . \quad . \quad . \quad (85.)$$

which is the equation sought.

Mr. Green*, considering a particular case of this multiple integral connected with the theory of the attractions of ellipsoids, has obtained an equation different from the above, and not involving the constants $h_1h_2..h_n$. It might be worth while to inquire whether the equation (85.) does not more precisely define the function to be determined than Mr. Green's equation does, and whether an analysis might not be founded upon it which should be more simple, and less dependent on foreign considerations. It would too much extend the limits of this paper to enter into the general discussion of the equation here, and I shall therefore merely observe that it is reducible whenever n is an odd integer, to the form

$$\frac{d^2u}{dt^2}-h_1^2\frac{d^2u}{da_1^2}-h_2^2\frac{d^2u}{da_2^2}-\cdots-h_n^2\frac{d^2u}{da_n^2}=0. \quad . \quad . \quad . \quad . \quad . \quad . \quad (86.)$$

To prove this, we remark that the constant in the second member of (84.) may be rejected, because in operating on both members with $\mathrm{D}(\mathrm{D}+n)$ it disappears. Writing then the equation in the form

$$u-\frac{\lambda^2}{\mathrm{D}(\mathrm{D}+n)}t^2 u=0,$$

let us assume

$$v-\frac{\lambda^2}{\mathrm{D}(\mathrm{D}-1)}t^2 v=0. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (87.)$$

By Propositions 2 and 3, C. § 1, we find

$$u=t^{-n}(\mathrm{D}-1)(\mathrm{D}-3)..(\mathrm{D}-n+2)v$$
$$=\frac{1}{t^n}\left(t\frac{d}{dt}-1\right)\left(t\frac{d}{dt}-3\right)..\left(t\frac{d}{dt}-n+2\right)v.$$

Then in (87.) making $t'=t$, we have

$$\frac{d^2v}{dt^2}-\lambda^2 v=0,$$

which is equivalent to (86.)

* Cambridge Philosophical Transactions, vol. v.

Ex. 3. *To evaluate the definite multiple integral*

$$V=\iint..\{\frac{dx_1dx_2..dx_n}{(a_1-x_1)^2+(a_2-x_2)^2..+(a_n-x_n)^2}\}^i, \quad . \quad . \quad . \quad . \quad . \quad . \quad (88)$$

n *being an odd integer,* i *any quantity whatever, positive or negative, integral or fractional, and the integrations extending to all real values of the variables, subject to the condition*

$$x_1^2+x_2^2..+x_n^2\leqq 1.$$

Here $\varphi(a_1a_2..a_n)=\frac{1}{(a_1^2+a_2^2..+a_n^2)^i}$. By induction it is easily shown * that

$$\left(\frac{d^2}{da_1^2}+\frac{d^2}{da_2^2}...+\frac{d^2}{da_n^2}\right)^r\frac{1}{(a_1^2+a_2^2...+a_n^2)^i}=\frac{2i(2i+2)...(2i+2p-2)(2i+2-n)..(2i+2p-n)}{(a_1^2+a_2^2..+a_n^2)^{i+p}}.$$

Hence the series (83.) becomes on making $(a_1^2+a_2^2..+a_n^2)^{\frac{1}{2}}=r$,

$$V=\frac{2\pi^{\frac{n}{2}}}{\Gamma\left(\frac{n}{2}\right)r^{2i}}\Sigma_{p=0}^{p=\infty}\frac{2i..(2i+2p-2)(2i+2-n)..(2i+2p-n)}{2.4..2pn(n+2)..(n+2p)}r^{-2p}, =\frac{2\pi}{\Gamma\left(\frac{n}{2}\right)r^{2i}}\Sigma_{p=0}^{p=\infty}u_{-2p}r^{-2p},$$

the law of the series being $u_{-2p}=\frac{(2p+2)(2p+n+2)}{(2p+2i)(2p+2i-n+2)}u_{-2p-2}$;

or putting $-2p=m$, $\qquad u_m-\frac{(m-2)(m-n-2)}{(m-2i)(m-2i+n-2)}u_{m-2}=0.$

And as the series extends to all the values of u_m which can be formed in subjection to the law, we have

$$u-\frac{(D-2)(D-n-2)}{(D-2i)(D-2i+n-2)}\varepsilon^{2i}u=0. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (89.)$$

To integrate this equation, assume

$$v-\frac{(D-n-1)(D-n-2)}{(D-2i+n-2)(D-2i+n-3)}\varepsilon^{2i}v=0. \quad . \quad . \quad . \quad . \quad . \quad . \quad (90.)$$

Then by (XIV.)

$$u=P_2\frac{(D-2)(D-2i+n-3)}{(D-n-1)(D-2i)}v,$$

$$=(D-2)..(D-n+1)(D-2i+n-3)..(D-2i+2)v,$$

$$=(D-2)^{\frac{n-1}{2}}\Big/_2(D-2i+n-3)^{\frac{n-3}{2}}\Big/_2v,$$

wherein the index $\frac{n-1}{2}\Big/_2$ denotes the product of $\frac{n-1}{2}$ factors, decreasing by a common difference 2.

The equation (90.), treated by the method of Prop. 1, C. § 1, gives

$$v=\frac{1}{2}(v_1+v_2)$$

$$v_1+\frac{D-n-1}{D-2i+n-2}\varepsilon^{i}v_1=0, \quad v_2-\frac{D-n-1}{D-2i+n-2}\varepsilon^{i}v_2=0.$$

* Cambridge Mathematical Journal, No. XIV. p. 63.

Whence determining v_1 and v_2,

$$v=\frac{C_1(r'+1)^{2n-2i-2}+C_2(r'-1)^{2n-2i-2}}{s^{(n-2i-2)\theta}}. \quad . \quad . \quad . \quad . \quad . \quad . \quad (91.)$$

If we substitute this value of v in that of u, determining the constants C_1 and C_2 by expansion and comparison with the original series, and effect some obvious reductions, we finally get*

$$V=\frac{2\pi^{\frac{n-1}{2}}}{r^{n-2}}\frac{\left(r\frac{d}{dr}+2i-n\right)^{\frac{n-1}{2}}\Big|_2\left(r\frac{d}{dr}-1\right)^{\frac{n-2}{2}}\Big|_2}{\left(2i-n+1\right)^{n}\Big|_1\left(i-1\right)^{\frac{n-2}{2}}\Big|_1}\{(r+1)^{2n-2i-2}-(r-1)^{2n-2i-2}\}. \quad . \quad . \quad (92.)$$

* This example is given merely for the sake of the process. The fullest development of the theory of definite multiple integrals will be found in the writings of M. Lejeune Dirichlet and Mr. Cayley. Some results, believed to be new, are subjoined.

1. If $u=\iint..dx_1dx_2..dx_n\phi(a_1-x_1,\ a_2-x_2..a_n-x_n)$ subject to the inequality $\frac{x_1^2}{h_1^2}+\frac{x_2^2}{h_2^2}..+\frac{x_n^2}{h_n^2}\leqq t^2$, then

$$u-\frac{\lambda^2}{D(D-n)}s^2u=0, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (a.)$$

where $\lambda^2=h_1^2\frac{d^2}{da_1^2}+h_2^2\frac{d^2}{da_2^2}..+h_n^2\frac{d^2}{da_n^2}$, and $s\phi=t$. This is a better form of the theorem in Ex. 2.

2. Let $u=\iint..dx_1dx_2..dx_n f(\Delta)$ in which $\Delta=\{(a_1-x_1)^2..+(a_n-x_n)^2\}^{\frac{1}{2}}$ subject to the inequality $x_1^2..+x_n^2\leqq t^2$, and let $(a_1^2..+a_n^2)^{\frac{1}{2}}=r$; it is evident that u is a function of t and r. Now

$$\left(\frac{d^2}{da_1^2}..+\frac{d^2}{da_n^2}\right)\phi(r)=\left(\frac{d^2}{dr^2}+\frac{n-1}{r}\frac{d}{dr}\right)\phi(r)=s^{-2r'}D^r(D'+n-2)\phi(s^{r'}) \text{ if } s^{r'}=r.$$

Thus (a.) may be put in the form

$$\frac{1}{D^r(D'+n-2)}s^{2r'}u-\frac{1}{D(D+n)}s^2u=0;$$

the complete integral of which, determined by Propositions 2 and 3, is

$$u=\frac{1}{r^{n-2}}\left(t\frac{d}{dt}-1\right)\left(t\frac{d}{dt}-3\right)..\left(t\frac{d}{dt}-n+2\right).\left(r\frac{d}{dr}-1\right)..\left(r\frac{d}{dr}-n+4\right)\Big\{\phi(r+t)+\psi(r-t)\Big\}.$$

In the case of $n=3$, we find on determining the arbitrary functions

$$u=\frac{2\pi}{r}\left(t\frac{d}{dt}-1\right)\{\phi(r+t)-\phi(r-t)\},$$

wherein $\phi(r)=\iiint rf(r)dr^3$. A similar analysis is applicable to the theory of the attractions of spheroids.

3. The evaluation of the definite integral $\int_0^\pi dx\,(\sin x)^n f(r+t\cos x)$ depends on a partial differential equation similar to the above. Its value is

$$u=2.4..(n-1)\left(t\frac{d}{dt}-1\right)\left(t\frac{d}{dt}-3\right)..\left(t\frac{d}{dt}-n+2\right)\left(\frac{d}{dr}\right)^{-n}\{f(r+t)-f(r-t)\}.$$

4. The evaluation of the definite multiple integral $\iint..dx_1..dx_n f(a_1x_1..+a_nx_n)\phi(x_1..+x_n)$ extending to the positive limits of the inequality $x_1...+x_n\leqq h$, depends on a partial differential equation of the first order; the result is

$$u=\Sigma\frac{a_1^{n-1}}{(a_1-a_2)(a_1-a_3)..(a_1-a_n)}\int_0^{a_1h}dt\phi(t)\left(\frac{d}{dt}\right)^{-n+1}f(a_1t).$$

A particular case of this theorem has been obtained by Mr. Leslie Ellis, by means of Fourier's theorem.

5. By a reverse application of the method we are able to assign the complete integral of the equation

$$\frac{d^2u}{dt^2}-h_1^2\frac{d^2u}{da_1^2}..-h_n^2\frac{d^2u}{da_n^2}=0, \text{ viz.}$$

F. § 1. *Theory of Equations of Finite Differences.*

If we assume $\pi=\frac{x(\varepsilon^{r\frac{d}{dx}}-1)}{r}$, $\varrho=x\varepsilon^{r\frac{d}{dx}}$, then it is shown (A. § 1.) that the following relations are satisfied:

$$f(\pi)\varrho^m u=\varrho^m f(\pi+m)u, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (93.)$$

$$f(\pi)\varrho^m=f(m)\varrho^m, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (94.)$$

and that

$$f(\pi+\varrho)=f(\pi)+\frac{\Delta}{\Delta\pi}f(\pi)\varrho+\frac{\Delta^2}{\Delta\pi^2}f(\pi)\frac{\varrho^2}{1.2}+\text{ &c.}, \quad . \quad . \quad . \quad . \quad . \quad (95.)$$

the interpretation of $\frac{\Delta}{\Delta\pi}$ here being $\frac{\Delta}{\Delta\pi}f(\pi)=f(\pi)-f(\pi-1)$.

If $r=-1$, we have $\pi=x-x\varepsilon^{-\frac{d}{dx}}$, $\varrho=x\varepsilon^{-\frac{d}{dx}}$, and the above relations are still satisfied. These values of π and ϱ we shall first employ.

Prop. 1. *Every equation in finite differences of the form*

$$X_0u_x+X_1u_{x-1}\ldots+X_nu_{x-n}=X,$$

$X_0X_1X_2$ &c. being rational and integral functions of x, may be reduced to the form

$$f_0(\pi)u_x+f_1(\pi)\varrho u_x+f_2(\pi)\varrho^2u_x+\text{ &c.}=U_x. \quad . \quad . \quad . \quad . \quad . \quad . \quad (96.)$$

For multiply both sides of the equation by $x(x-1)..(x-n+1)$, and in the second term of the first member for xu_{x-1} write ϱu_x in the third term for $x(x-1)u_{x-2}$ write ϱ^2u_x, &c., we shall have a result of the form

$$\varphi_0(x)u_x+\varphi_1(x)\varrho u_x+\varphi_2(x)\varrho^2u_x..+\varphi_n(x)\varrho^nu_x=U_x, \quad . \quad . \quad . \quad . \quad (97.)$$

wherein $\varphi_0(x)=x(x-1)..(x-n+1)X_0$, $\varphi_1(x)=(x-1)..(x-n+1)X_1,\ldots$ $U_x=x(x-1)..(x-n+1)X$, being all rational and integral functions of x. Now $\pi=x\left(1-\varepsilon^{-\frac{d}{dx}}\right)$, $\varrho=x\varepsilon^{-\frac{d}{dx}}$, whence $x=\pi+\varrho$. It only remains then to develope $\varphi_0(x)$, $\varphi_1(x)$, &c. in ascending powers of ϱ. Writing then x for $\pi+\varrho$ in the first member of (95.), we have

$$f(x)=f(\pi)+\frac{\Delta}{\Delta\pi}f(\pi)\varrho+\frac{1}{1.2}\frac{\Delta^2}{\Delta\pi^2}f(\pi)\varrho^2+\text{ &c.}, \quad . \quad . \quad . \quad . \quad . \quad (98.)$$

the interpretation of $\frac{\Delta}{\Delta\pi}$ remaining as above.

$$u=\frac{1}{t^{n-1}}t\frac{d}{dt}\left(t\frac{d}{dt}-2\right)..\left(t\frac{d}{dt}-n+3\right)\iint..dx_1..dx_n\varphi(a_1-x_1,\ a_2-x_2..a_n-x_n),$$

$$+\frac{d}{dt}\left\{\frac{1}{t^{n-1}}t\frac{d}{dt}\left(t\frac{d}{dt}-2\right)..\left(t\frac{d}{dt}-n+3\right)\iint..dx_1..dx_n\psi(a_1-x_1,\ a_2-x_2..a_n-x_n)\right\};$$

the limits being given by the inequality

$$\frac{x_1^2}{h_1^2}+\frac{x_2^2}{h_2^2}..+\frac{x_n^2}{h_n^2}=t^2.$$

This solution requires that n should be odd. If $n=3$, the result is equivalent to Poisson's, but is in a form perhaps more convenient for physical deductions.

Developing by this theorem the coefficients of (97.), the result will assume the form

$$f_0(\pi)u_x+f_1(\pi)\varrho u_x+f_2(\pi)\varrho^2u_x+\&c.=U_x, \quad . \quad . \quad . \quad . \quad . \quad (XXI.)$$

as was proposed to be shown. We shall call this the symbolical form of the equation.

To revert from the symbolical to the common form, it is only necessary to observe that since $\pi=x-\varrho$, and since x and ϱ combine according to the law $\varrho^x u_x=(x-1)\varrho u_x$, we have

$$f(\pi)=f(x)-\frac{\Delta}{\Delta x}f(x)\varrho+\frac{\Delta^2}{\Delta x^2}f(x)\frac{\varrho^2}{1.2}-\&c., \quad . \quad . \quad . \quad . \quad (XXII.)$$

wherein $\Delta x=-1$, and consequently $\frac{\Delta}{\Delta x}f(x)=f(x)-f(x-1)$. Developing by this theorem the coefficients, and writing for $\varrho^m u_x$ its value $x(x-1)\ldots(x-m+1)u_{x-m}$, the required reversion will be effected.

F. § 2. *On the Solution of Equations of Finite Differences in Series.*

In the equation $\quad f_0(\pi)u_x+f_1(\pi)\varrho u_x\ldots+f_r(\pi)\varrho^r u_x=0,$

assume $u_x=\Sigma u_m\varrho^m$ then precisely as in the case of differential equations,

$$f_0(m)u_m+f_1(m)u_{m-1}\ldots+f_r(m)u_{m-r}=0. \quad . \quad . \quad . \quad . \quad (XXIII.)$$

The initial values of m are determined by the equation $f_0(m)=0$. For every such value u_m is an arbitrary constant, for all other values it is successively determined by (XXIII.)

Ex. 1. Given $(x-a)u_x-(2x-a-1)u_{x-1}+(1-q^2)(x-1)u_{x-2}=0.$

The operation at length stands thus:

Multiply by x, we have

$$x(x-a)u_x-(2x-a-1)xu_{x-1}+(1-q^2)x(x-1)u_{x-2}=0. \quad . \quad . \quad . \quad (99.)$$

Or $\quad x(x-a)u_x-(2x-a-1)\varrho u_x+(1-q^2)\varrho^2u_x=0. \quad . \quad . \quad . \quad . \quad . \quad (100.)$

Now developing the coefficients by (98.), we find

$$x(x-a)=\pi(\pi-a)+(2\pi-a-1)\varrho+\varrho^2,$$

$$2x-a-1=2\pi-a-1+2\varrho,$$

whence substituting in (100.)

$$\pi(\pi-a)u_x-q^2\varrho^2u_x=0,$$

wherefore $u=\Sigma a_m\varrho^m$, with the relation

$$m(m-a)a_m-q^2a_{m-2}=0,$$

$$\text{or} \quad a_m=\frac{q^2a_{m-2}}{m(m-a)}.$$

The equation $m(m-a)=0$ gives 0 and a for the lowest values of m, wherefore, finally,

$$u_x=C\left(1+\frac{q^2x(x-1)}{2.2-a}+\frac{q^4x(x-1)(x-2)(x-3)}{2.4(2-a)(4-a)}+\&c\ldots\right),$$

$$+C_1\left(x(x-1)\ldots(x-a+1)+\frac{q^2x(x-1)\ldots(x-a-1)}{2(2+a)}+\frac{q^4x(x-1)\ldots(x-a-3)}{2.4(2+a)(4+a)}+\&c.\right).$$

We have here two distinct series. Either of these is an integral of the equation (99.), but I apprehend that the second series only can be regarded as an integral of the original equation. The first series appears to have reference only to the irrelevant factor x. As I am not aware that this distinction has been before observed, and as it appears to affect the validity of the canon which assigns to the integral of an equation of differences just so many arbitrary constants as there are units in the index of its order, I shall make no apology for adducing another illustration.

Let us take the equation

$$xu_x=0. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (101.)$$

We find as the symbolical form,

$$(x+\varrho)u_x=0;$$

whence $u_x=\Sigma a_m\varrho^m$ with the relation $ma_m+a_{m-1}=0$, or $a_m=-\frac{a_{m-1}}{m}$, the lowest value of m being 0, whence

$$u_x=C\left(1-\frac{x}{1}+\frac{x(x-1)}{1.2}-\frac{x(x-1)(x-2)}{1.2.3}+\&c.\right),$$
$$=C(1-1)^x,$$
$$=C0^x.$$

This is obviously a true integral of (101.) for all values of x from 0 to ∞; for when $x=0$ it gives $u_x=C$, and when x is any positive quantity, $u_x=0$, precisely as it ought to do. Moreover it involves an arbitrary constant C; but (101.) being of the 0th order, there should, according to the received canon, be no arbitrary constant in its integral.

For the solution of the equation $x(x-1)u_x=0$, we similarly find

$$u_x=a_0+a_1x+a_2x(x-1)+a_3x(x-1)(x-2)+\&c.,$$

wherein a_0, a_1 are arbitrary constants, and in general

$$a_m=-\frac{2(m-1)a_{m-1}+a_{m-2}}{m(m-1)},$$

this gives

$$u_x=a_0+a_1x-\frac{2a_1+a_0}{2}x(x-1)+\frac{3a_1-2a_0}{6}x(x-1)(x-2)-\&c.$$

For the values $x=0$, $x=1$, the above series is reduced to an arbitrary constant; for all other positive values of x it vanishes. Here then we obtain for an equation of the 0th degree, a solution involving two arbitrary constants, and derived from the two irrelevant factors x and $x-1$.

It would be interesting to inquire whether an equation of differences admits of integration by series when $f_0(m)$ has equal or imaginary factors. After paying some attention to this question, I am disposed to think that such cases are not comprehended in any theory analogous to that which I have given for the corresponding class of differential equations.

On the subject of this section the reader may consult a paper by Mr. Bronwin in the Cambridge Mathematical Journal, vol. iii.

F. § 3. *On the Solution of Equations of Differences in Finite Terms.*

We have in the preceding section supposed $\pi = x - x\varepsilon^{-\frac{d}{dx}}$, $\varrho = x\varepsilon^{-\frac{d}{dx}}$, and have thus satisfied the relations (93.), (94.). We shall, in the following section, with greater generality assume (A. Prop. 3.),

$$\pi = x - n\phi(x)\varepsilon^{-\frac{d}{dx}}, \quad \varrho = \varphi(x)\varepsilon^{-\frac{d}{dx}}.$$

The condition (93.) will still be satisfied, and the expansion of $f(\pi+\varrho)$ will remain unchanged.

We shall suppose the equation to be placed, as in all ordinary cases it may, under the form

$$f_0(x)u_x + f_1(x)\varphi(x)u_{x-1} + f_2(x)\varphi(x)\varphi(x-1)u_{x-2} + \&c. = U, \quad . \quad . \quad . \quad (102)$$

$f_0(x)$, $f_1(x)$, &c. being rational and integral functions of x, or at least susceptible of expansion in ascending powers of x, and $\varphi(x)$ any function whatever.

Since $\varphi(x)\varepsilon^{-\frac{d}{dx}} = \varrho$, we have $\varphi(x)\varphi(x-1)\varepsilon^{-2\frac{d}{dx}} = \varrho^2$, and so on; wherefore, writing u for u_x, we have

$$f_0(x)u + f_1(x)\varrho u + f_2(x)\varrho^2 u + \&c. = U.$$

Now since $\pi = x - n\varrho$, we have $x = \pi + n\varrho$, and expanding the coefficients $f_0(x)$ $f_1(x)$, &c. by (I.), the equation will assume the form

$$\varphi_0(\pi)u + \varphi_1(\pi)\varrho u + \varphi_2(\pi)\varrho^2 u + \&c. = U. \quad . \quad . \quad . \quad . \quad . \quad (XXIV.)$$

This equation is integrable in several cases:

1st. If by any determination of n the equation should be reducible to a single term. Suppose that it should give

$$\varphi_0(\pi)u = U, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (103.)$$

then resolving $\varphi_0(\pi)$ into its factors, we shall have a system of equations each being of the form

$$(\pi - a)u = U;$$

or

$$(x-a)u_x - n\varphi(x)u_{x-1} = U,$$

which is completely integrable.

This method enables us to integrate all equations of the form (102.), in which

$$f_m(x) = \frac{h}{m}(f_{m-1}(x) - f_{m-1}(x-1)), \quad . \quad . \quad . \quad . \quad . \quad . \quad (104.)$$

h being any constant. We should find $n = -h$, $\pi = x + h\varphi(x)\varepsilon^{-\frac{d}{dx}}$, and $f_0(\pi)u = U$. I am not aware that this general class of equations has been considered before. A method of integrating equations of the form

$$x(x-1)..(x-n+1)\Delta^n u_{x-n} + a_1 x(x-1)..(x-n+2)\Delta^{n-1}u_{x-n+1} + \&c. = 0,$$

was communicated to me by Mr. Gregory*. In reality however they constitute a particular case of the above, the value of π being $x - x\varepsilon^{-\frac{d}{dx}}$.

* Late Fellow of Trinity College, Cambridge, and author of the well-known "Examples." Few in so short a life have done so much for science. The high sense which I entertain of his merits as a mathematician, is mingled with feelings of gratitude for much valuable assistance rendered to me in my earlier essays.

2nd. If the coefficients $\varphi_0(\pi)$, $\varphi_1(\pi)$, &c. are constant quantities. This happens in the well-known class of equations

$$u_x+a_1\varphi(x)u_{x-1}+a_2\varphi(x)\varphi(x-1)u_{x-2}+\&c.=U,$$

which becomes

$$(1+a_1\varrho+a_2\varrho^2+\&c.)u_x=U,$$

and is integrable by resolution of the operating factor, as in equations with constant coefficients. It may be worth while to note that this class of equations, when of the nth degree, involves one arbitrary function $\varphi(x)$, and n arbitrary constants, $a_1..a_n$; but the preceding class under the same circumstances involves one arbitrary function with $n+1$ arbitrary constants, viz. h with n constants in $f_0(x)$. It is therefore the more general of the two.

3rd. If the equation should consist of only two terms. Suppose that it should be reducible to the form

$$\varphi_0(\pi)u+\varphi_1(\pi)\varrho^n u=U,$$

which may be put under the form

$$u+\varphi(\pi)\varrho^n u=U_1. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (105.)$$

Proceeding as in the corresponding case of C. § 2, it may in all cases be determined whether the equation is integrable or not.

In general the equation $u+\varphi(\pi)\varrho^n u=U$ can be reduced to the form $v+\psi(\pi)\varrho^n v=V$ by the relations

$$u=P_n\frac{\varphi(\pi)}{\psi(\pi)}v, \quad U=P_n\frac{\varphi(\pi)}{\psi(\pi)}V, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (106.)$$

precisely as in differential equations.

Thus, to pursue the analogy, the equation

$$u+\frac{q^n}{(\pi+a_1)(\pi+a_2)\ldots(\pi+a_n)}\varrho^n u=U,$$

in which $a_1a_2..a_n$ are in the order of magnitude, can be reduced to the form

$$v+\frac{q^n}{\pi(\pi-1)..(\pi-n+1)}\varrho^n v=V,$$

and then integrated by resolution into a system of equations of the first order, provided that the quantities

$$\frac{a_1-a_2-1}{n}, \quad \frac{a_1-a_3-2}{n}, \quad \frac{a_1-a_4-3}{n}, \quad \frac{a_1-a_n-n+1}{n}$$

are all integers.

Ex. Given $(x^2+ax+b)u_x+(2x-a-1)h\varphi(x)u_{x-1}+(h^2-q^2)\varphi(x)\varphi(x-1)u_{x-2}=0.$

Let $\pi=x-n\varphi(x)\varepsilon^{-\frac{d}{dx}}$, $\varrho=\varphi(x)\varepsilon^{-\frac{d}{dx}}$, then

$$(x^2+ax+b)u+(2x-a-1)h\varrho u+(h^2-q^2)\varrho^2 u=0.$$

Now $x=\pi+n\varrho$, therefore

$$x^2+ax+b=\pi^2+a\pi+b+(2\pi-a-1)n\varrho+n^2\varrho^2,$$

$$2x-a-1=2\pi-a-1+2n\varrho,$$

and substituting, we have

$$(\pi^2+a\pi+b)u+(2\pi-a-1)(n+h)\varepsilon u+(n^2+2nh+h^2-q^2)\varepsilon^2 u=0.$$

To take away the second term, let $n=-h$, then

$$(\pi^2+a\pi+b)u-q^2\varepsilon^2 u=0.$$

Let $\pi+a_1$, $\pi+a_2$ be the factors of $\pi^2+a\pi+b$, then

$$u-\frac{q^2}{(\pi+a_1)(\pi+a_2)}\varepsilon^2 u=0.$$

To integrate this equation, assume

$$v-\frac{q^2}{(\pi+a_1)(\pi+a_1-1)}\varepsilon^2 v=0, \quad \ldots\ldots\ldots \quad (107.)$$

then $$u=\mathrm{P}_2\frac{\pi+a_1-1}{\pi+a_2}v=(\pi+a_1-1)(\pi+a_1-3)\ldots(\pi+a_2+2)v,$$

which is only finite when a_1-a_2 is an odd integer.

From (107.) we have

$$v=\frac{1}{2}(s_x+t_x),$$

$$s_x-\frac{q}{\pi+a_1}\varepsilon s_x=0,$$

$$t_x+\frac{q}{\pi+a_1}\varepsilon t_x=0;$$

from the first of which equations,

$$(\pi+a_1)s_x-q\varepsilon s_x=0,$$

$$\therefore \quad \left(x+h\varphi(x)\varepsilon^{-\frac{d}{dx}}\right)s_x+a_1 s_x-q\varphi(x)\varepsilon^{-\frac{d}{dx}}s_x=0.$$

Or $$(x+a_1)s_x+(h-q)\varphi(x)s^{x-1}=0,$$

$$\therefore \quad s_x=\mathrm{C}_1\mathrm{P}\frac{(q-h)\varphi(x)}{x+a_1},$$

$$=\mathrm{C}_1(q-h)^x\mathrm{P}\frac{\varphi(x)}{x+a_1}.$$

In like manner,

$$t_x=\mathrm{C}_2(q+h)^x\mathrm{P}\frac{\varphi(x)}{x+a_1};$$

and as the constants C_1, C_2 are arbitrary,

$$v=\{\mathrm{C}_1(q-h)^x+\mathrm{C}_2(q+h)^x\}\mathrm{P}\frac{\varphi(x)}{x+a_1},$$

$$u=(\pi+a_1-1)(\pi+a_1-3)\ldots(\pi+a_2+2)\{\mathrm{C}_1(q-h)^x+\mathrm{C}_2(q+h)^x\}\mathrm{P}\frac{\varphi(x)}{x+a_1},$$

to interpret which we have only to observe that

$$\pi f(x)=xf(x)+h\varphi(x)f(x-1).$$

This solution may be put under the form

$$u=\{\mathrm{P}\varphi(x)\}(\pi_1+a_1-1)(\pi_1+a_1-3)\ldots(\pi_1+a_2+2)\left\{\frac{\mathrm{C}_1(q-h)^x+\mathrm{C}_2(q+h)^x}{\mathrm{P}(x+a_1)}\right\},$$

the interpretation of π_1 being

$$\pi_1 f(x)=xf(x)+hf(x-1).$$

The method of this section will, I believe, be found to succeed in every known integrable case, while it includes some unknown before, one of which is the most general yet discovered.

Postscript.

The general rule for the integration of linear differential equations in series, B. § 2, requires in a particular case to be slightly modified. If $f_0(\mathrm{D})$ involves a pair of factors such as $\varphi(\mathrm{D})$, $\varphi(\mathrm{D}+r)$, r being a multiple of the common difference of the values of m, we must in the equation of $f_0(\mathrm{D})u=0$ write $\{\varphi(\mathrm{D})\}^2$ in place of $\varphi(\mathrm{D})\varphi(\mathrm{D}+r)$, and similarly when there are more such factors. Thus, in the equation $\mathrm{D}(\mathrm{D}+2)u-q^2i^2u=0$, the form of the assumption for u will be determined by the equation $\mathrm{D}^2u=0$, and not by $\mathrm{D}(\mathrm{D}+r)u=0$. A slight change of expression would make the rule as general as the principle on which it is founded, and reduce to its dominion every case in which a linear differential equation can be integrated by ascending or descending developments. The theory of series infinite in both directions still remains to be examined.

Fearful of extending this paper beyond its due limits, I have abstained from introducing any researches not essential to the development of that general method in analysis which it was proposed to exhibit. It may however be remarked that the principles on which the method is founded have a much wider range. They may be applied to the solution of functional equations, to the theory of expansions, and, to a certain extent, to the integration of non-linear differential equations. The position which I am most anxious to establish is, that any great advance in the higher analysis must be sought for by an increased attention to the laws of the combinations of symbols. The value of this principle can scarcely be overrated; and I only regret that in the absence of books, and under circumstances unfavourable for mathematical investigation, I have not been able to do that justice to it in this essay which its importance demands.

Lincoln, August 31, 1844.

IX. *On the Reproduction of lost parts in Myriapoda and Insecta.*

By George Newport, *Esq., F.R.C.S., President of the Entomological Society of London, and Corresponding Member of the Philomathic Society of Paris. Communicated by* P. M. Roget, *M.D., Sec. R.S.*

Received June 20,—Read June 20, 1844.

THE reproduction of parts of the body that have been accidentally lost or removed, is an occurrence of so much interest, in relation to the laws of nutrition and development, that I am induced to trespass on the attention of the Royal Society with an account of some experiments on this subject in the Myriapoda and Insecta. It has long been known to every naturalist that the Crustacea and Arachnida are capable of reproducing their limbs; and it has also been stated that a similar reproduction of parts takes place in some of those insects which are active throughout their whole life, and do not change their form, but merely cast their tegument and increase in size. But it has been questioned whether any reproduction of lost parts can take place in those insects which undergo a complete metamorphosis, and change their form, their food and mode of life in passing from the young to the adult state. No investigations have hitherto been undertaken to decide the question in insects that undergo these changes, nor have any experiments been made to show that a reproduction of lost parts is common also to the whole of the Class Myriapoda.

At a meeting of the Entomological Society in November 1839*, I exhibited a specimen of *Scolopendra sub-spinipes*, which had the eleventh leg, on the left side of the body, so much smaller than the corresponding one on the right, although otherwise perfect in regard to the number of its articulations, that I regarded it as a marked instance of reproduction of the limbs in that class. As no experiments had then been made to prove the fact, this opinion was disputed, and the instance pointed out was considered as merely one of an arrest of development†. Since then it has been shown‡, as first noticed by Müller§, that a reproduction of the legs most certainly takes place in the *Phasmidæ*; but it is still doubted whether it can occur in the Lepidoptera, and other tribes that undergo a complete change.

In the summer of 1841, and also in 1842, I made a series of experiments on this subject, on the Myriapoda; and during the present summer have completed a similar

* Transactions of the Entomological Society of London, vol. iii. part 1. p. 33.

† Idem. Journal of Proceedings, Nov. 2, 1840, p. 14.

‡ Id. January 1, 1844. President's Address, 1844, p. 5.

§ Elements of Physiology, Dr. Baly's translation, Edit. 1. 1837, p. 405.

series on Lepidopterous insects, the results of which I have now the honour to communicate to the Royal Society.

Myriapoda.

The facts already ascertained respecting the periodical development of new segments to the body in this class, led me to anticipate a favourable result in experimenting on the reproduction of the antennæ and legs. In the spring of 1841, I had placed about thirty nearly full-grown individuals of *Iulis terrestris* and *Iulis niger* in a closed vessel filled with clay and mould. Many of these individuals deposited ova, some of which I succeeded in rearing.

During the time these Iuli were confined together, I found several of them deprived of one of the antennæ, and also of some of the legs, which I attributed to their attacks on each other. This circumstance led me further to believe that these organs when lost are reproduced. In order to put this conclusion to the test, I cut off one of the antennæ and some of the legs of an individual that had not yet attained to more than two-thirds of the adult size of the species, and confined it in company with others of the same age. A few weeks afterwards all the specimens had changed their skins and grown much larger, having also gained an addition of segments to the body; but the antennæ and legs of the mutilated specimen had been so completely reproduced, that I could not identify the individual that had been the subject of the experiment. As, in consequence of this, the experiment was not entirely satisfactory, although it sufficiently proved to me that reproduction had actually taken place, I cut off one of the antennæ, and some of the legs, from each of three specimens that had much nearer approached their adult state. These were confined together in the same vessel, and were nearly of the same age. After watching them closely for about three months, without discovering any signs of regeneration of the lost parts, I began to fear that there must have been some error in my previous observations. However, I allowed them to remain undisturbed during the whole of the spring and commencement of summer, giving them constantly a fresh supply of food, the decaying inner bark of trees.

They continued in this state until the middle of June, when the whole of them entered the earth, and each made for itself a little circular cavity, in which it lay coiled up in a spiral form, and passed into a state of what has been designated summer hybernation, and remained until the end of July. This I found is the usual habit of the species, and did not depend on the mutilations, as during the same period I discovered many Iuli similarly concealed in the earth in their native haunts: many individuals die at this period in their estivatories, but these appear to have arrived at their full maturity, and become aged, having already deposited their ova in the spring. Those which are not yet matured now cast their teguments, and have their lost parts reproduced. The casting of the skin is a difficult and tedious occurrence. For several days after it has taken place the Iuli are unable to venture forth from their

cells, but remain coiled up until their new covering has acquired strength and consolidation. When the specimens that had been deprived of their antennæ again made their appearance, I found that the experiment had been entirely successful. Each individual now had its antenna and legs reproduced; but the new parts were much shorter and smaller, and of a more delicate colour, than the uninjured corresponding parts in the same animal. The new antenna was but little more than one-half the length of the original one, and was very rarely used for touching and exploring objects, but seemed to be carefully preserved by the animal from coming into contact with anything. In two of the individuals the new organ had but six joints (Plate XIV. figs. 1 and 2.), but in these instances nearly the whole organ had been reproduced, having been cut off close to the basal joint (*a*). In the other instance the new antenna had seven joints, like the original one, but in this case the antenna had been divided, and reproduction commenced in the middle of the third basal joint (fig. 3. *b*). The joints of the new antennæ were much thicker in proportion to their length than in the perfect organ. They were thickest at each extremity, each joint resembling a figure of eight, or an elongated hour-glass. The apical joint of the antenna was very minute, and sunk into the preceding one. Each joint was encircled with hairs at its distal extremity, while the joints of the original antennæ had only a few scattered hairs on their under surface. In addition to this, the articulations of the new joints were less perfect than in the old, the intussusceptions or reduplications of the tegument forming the articulations being exceedingly slight.

There was one circumstance in connexion with these reproductions that seems especially worthy of notice. In the antenna (fig. 3.) that had been divided in the middle of the third basal joint, the junction of the new with the original part of the organ was clearly indicated by a marked difference of colour in the two portions of that joint, in which the reproduction commenced. Thus it was not the whole organ that was reproduced, in this instance, but only so many joints of it as were deficient,—part of the third, the fourth, fifth, sixth and seventh. It does not appear necessary, therefore, that, when one part has been lost, the entire organ must be removed before reproduction can take place, as is believed to be the case with the limbs of Crustacea; but reparation begins in the part in which the injury occurs, and the new structures produced are only sufficient to replace those which have been removed. In the other two instances of reproduction of the antennæ, the reparation commenced at the articulation of the first basal joint with the second (fig. 1. *a*), the basal joint of the original organ being left attached to the head in each experiment. In these two instances, as already stated, there were only six joints to the new antennæ. This deficiency I am inclined to attribute to the circumstance that the individuals had very nearly approached the time when the power of reproducing parts of their own bodies had greatly decreased, and would soon altogether cease, as was shown in the circumstance, that they had so nearly reached their adult state, that each acquired only one new segment to its body at this change of tegument, the next change of which would perhaps have been the last.

It is thus proved that the legs and antennæ of the Iulidæ are reproduced at the change of skin. Since making these experiments, I have met with many instances in which these parts have been reproduced, as indicated by comparison with corresponding parts in the same animals. In no instance has the fact been better exemplified in the Iulidæ than in a specimen of *Spirostreptus microsticticus**, Newp., from the coast of Africa, now in the cabinets of the British Museum, in which most of the legs on the left side of five segments of the body, from the thirty-ninth to the forty-third, have been reproduced, while the animal was living in its natural haunts. In most of these the entire limbs, including their basilar or coxal joints, have been restored, each limb being perfect in all its joints, even including the terminal claw, although not more than one-half the size of the corresponding limb on the opposite side of the same segment. From these facts, it appears that the reproduction of a lost part in the Iulidæ may take place either in connexion with some portion of the original organ, or may be entirely independent of it, as when every portion of the original organ is removed.

The reproduction of lost parts in the Chilopoda differs a little from that of the Chilognatha. Although I do not intend on the present occasion to give a detailed account of the changes and growth of animals of this order, I may state that the *Lithobii* differ a little from the Iulidæ in the mode of development of their segments and legs. Like the Iulidæ they change their tegument in the young state very frequently, and at each change, two pairs of legs, which have previously made their appearance at the sides of the new segments as very minute projecting appendages, are elongated and assume the structure and function of legs. The young Lithobius very frequently loses some of its limbs, probably from being attacked by others of its carnivorous species, as frequently occurs when several of these are kept together in confinement.

It was a specimen of *Lithobius vulgaris*, Newp. that had previously acquired its tenth pair of legs, but had very recently suffered the loss of the eighth, ninth, and tenth pairs of those organs, that formed the subject of this part of my investigations. At this period of its life the little animal is very delicate, but active, and endowed with all the ferocious habits of the adult. It was now scarcely more than one quarter of an inch in length. I had feared that at this early period the young Myriapod might not be able to support so much injury, and be able to reproduce so many pairs of lost organs. But it moved about with the remaining seven pairs of legs with its usual activity, as if in an uninjured state, and did not appear to be at all inconvenienced by its loss; but it carefully avoided coming in contact with others of its own species that were confined with it in the same phial. On this account I removed it to another phial, in order to watch its progress more accurately. Each of the legs that were lost had been removed at the articulation of the femur with the coxal joint,

* List of the Specimens of Myriapoda in the Collection of the British Museum, by John Edward Gray, printed by order of the Trustees, 1844, p. 14.

and from the enlarged condition of the latter part I at once suspected that new limbs were about to be produced.

On the 10th of September 1842, a few days after the commencement of my observations on this individual, the young Lithobius changed its skin, and, to my great satisfaction, not only developed two additional pairs of legs, but also reproduced three other pairs in the place of those that had been lost. Thus three pairs of organs were developed at this change, besides those which make their appearance in the usual course of growth. These three pairs of reproduced legs made their appearance at the sides of the segments, without having previously been developed in a more rudimentary form, as is always the case with the legs of Lithobius when first produced. But they were exceedingly delicate, and were much smaller than the others. They gradually increased in size, and continued to grow for a short time after the casting of the skin. The two pairs of additional legs developed at this change, and now constituting the eleventh and twelfth pairs of the body, were at first larger than the reproduced ones, and continued to grow until the next change. On the 15th of September the three pairs of reproduced legs seemed to have attained their maximum of development until the next casting of the skin, but they were not so large by one-third as the legs immediately anterior to them.

On the 24th of October the young Lithobius again lost one of its legs. This was the twelfth one on the left side that had been developed at the preceding change. Nothing further took place, either in this individual or in others of the same age, with twelve pairs of legs, until the 7th of November, when it again changed its skin, and acquired three additional pairs of legs,—thus completing the adult number, fifteen. At this time it was nearly half an inch in length. I now found not only that the first reproduced legs had very nearly attained their proper size, but also that a new leg had been developed in the place of the one that was lost on the 24th of October, but this was very much smaller than the others. The two posterior pairs of legs, at this period, were scarcely so long as those immediately anterior to them, were applied very closely together, and were entirely useless. They continued to grow in length and size, and gradually acquired a power of motion. On the 18th of November the posterior segments and legs in the young animal had nearly attained their relative proportions. On the 30th of November the posterior legs were widely separated from each other, and were occasionally employed by the animal in its retrograde movements. In this condition it remained till the end of January, having passed the interval in a state of partial hybernation. It did not again change its skin until the middle of April. During this interval the posterior pairs of legs continued to be elongated, and the reproduced legs, acquired at the two preceding castings of the tegument, were also enlarged, but still continued smaller than the others. I attributed this in part to the animal not having been supplied with a sufficiency of food. On the morning of the 22nd of May it again changed its skin, and the reproduced legs had now acquired their full size. On the

INSTITUTE LIBRARY

3rd of August it underwent another change of covering, after which no difference could be perceived in the size of the reproduced and of the original legs. At this time my observations were discontinued.

These facts sufficiently show that a power of reproducing lost parts is quite common to the Lithobii, and the frequent occurrence of legs that have not their full size, in specimens of foreign *Scolopendræ*, lead to the conclusion that it is equally common to those animals. There are many instances of this in the collection in the British Museum, in the majority of which it is one of the posterior legs that has been reproduced. From the number of specimens I have met with in which this is the case, I have been enabled to arrive at the conclusion, that although reproduced limbs in these animals may ultimately attain the full size of the normal structures, they never acquire a perfectly normal development of all their parts, which are sometimes supernumerary, but more frequently are deficient in number, and are almost invariably atrophied. This is strikingly illustrated in the development of the spines with which the basal joints of the posterior legs of the Scolopendræ are armed. This fact is of consequence in a zoological point of view; as these parts have recently been much depended on in the determination of species. It is also, perhaps, of some value in relation to the laws of development, since it is found to be equally constant, as I shall presently show, in the reproduced parts of the true Insecta.

Insecta.

Some experiments formerly made by Dr. Heineke* on the Blattæ, have already shown that these insects, which do not undergo any metamorphosis but a change of tegument, have a power of reproducing the antennæ in their young state. But no experiments were made by that naturalist to prove that the legs also are capable of being reproduced. Professor Müller†, however, first showed that the *Phasmidæ*, which likewise undergo no transformation, can reproduce their legs, when lost at an early period. This has recently been fully confirmed by Mr. Fortnum, in the *Diura violescens*, Gray, of Australia, as communicated by letter to the Rev. F. W. Hope‡. I may also remark, that I have recently found a specimen of Phasma in the cabinets of the British Museum, in which the right anterior leg has been reproduced, in a large species (fig. 4.), *Alopus cocophages*, Gray, MSS., an insect from Navigator's Island, destructive to the young buds of cocoa-nut trees. This instance affords a striking exemplification of the usually incomplete development of reproduced organs. Not only is the whole limb in this specimen much shorter than the corresponding one on the opposite side, but its third tarsal joint is absent, and the other joints are imperfectly formed.

In order to ascertain whether reproduction of the limbs can take place in insects that undergo a complete metamorphosis in form, in habit, and mode of life, I have

* Zoological Journal, vol. iv. p. 422. † *Loc. cit.* p. 405.

‡ Proceedings of the Entomological Society of London, January 1, 1844.

instituted a series of experiments on the larvæ of the common Nettle Butterfly, *Vanessa urticæ*.

On the 24th of May, in the present summer, I removed with the scissors two of the true legs of the caterpillar, on the left side of the body, from each of twelve specimens that had not yet passed into their last stage as larvæ, but were still in their *fourth* period. These legs were either entirely removed at their base, close to the body, or in the tibial or femoral joints. On the following morning I removed the intermediate, or the posterior leg, on the left side, from each of sixteen other specimens which had already entered their last larva skin, or *fifth* period. Six of these were nearly full-grown, and would have entered their pupa state in the course of a few days. The remaining ten had only recently entered their last skin. The whole of these twenty-eight larvæ were confined together in a glass vessel, and well supplied with food. Some of the specimens seemed to be but little affected by the operation, as they immediately began to feed very actively; but on the following morning several of them had died from its results. In the whole of those which had the legs removed at the base the hæmorrhage was at first very considerable; but in those which had the limb removed at the tibial joint it was not so profuse. In the specimens in which the limb was removed at the tibio-tarsal joint the hæmorrhage soon ceased, but in those in which the wound was more serious, it was less readily suppressed. But even the individuals that were most injured began to feed with avidity immediately after the operation, notwithstanding the excessive hæmorrhage that was going on. One of these specimens had not only lost the whole of its meso-thoracic leg, but was also punctured on the back, and from both wounds the green transparent circulatory fluid flowed in large quantity; but the insect still continued to feed very eagerly. In less than half an hour I had the satisfaction to find that a coagulation of the effused blood was taking place over the wounds, although at each contortion of the body the fluid gushed forth afresh. In three quarters of an hour the blood had become somewhat more firmly coagulated, and formed a dark black patch, or eschar, over the injured parts. In this way, by a coagulation of the effused fluid, the hæmorrhage from wounds in insects is first arrested. The rapidity with which this coagulation takes place seems to depend greatly on the temperature and comparative dryness of the atmosphere; since if the air of the locality in which the insect is confined be loaded with moisture, the hæmorrhage continues for a long time, and the individuals often die, as was the case with some of my first series. It was in consequence of not being aware of this, at the commencement of my experiments, that a greater number of specimens died than would otherwise have been lost from the operations. On the fourth day only twenty-two were still living; but this great mortality was clearly attributable to the cause I have stated. At the expiration of nine days, one of the six larvæ that were nearly full-grown when the experiments were commenced, changed to a chrysalis. At that time only seventeen specimens remained out of the original twenty-eight. Those which died were chiefly the youngest ones. By the thirteenth day, June 5th,

the remaining specimens of the same brood had also entered the pupa state, leaving only five out of the twelve individuals first operated on, which had not then entered the last state of larvæ, still surviving the operation. By the 9th of June, the seventeenth day after the operation, these also had changed to chrysalids. It was thus evident that a removal of the limbs does not necessarily prevent the insect from undergoing its natural transformations.

During the growth of these specimens there were several circumstances that appeared well worthy of notice. It soon became evident that even in those instances in which the insects survived the operation their development was considerably retarded by it. This was shown by comparing the length of time that elapsed in their different states, with that required by other specimens of the same age, that had not undergone any operation before they changed to chrysalids,—the circumstances, in regard to age, quantity and quality of food, temperature, and locality in which they were placed, being in all exactly the same. In every instance the uninjured specimens prepared themselves for transformation very much earlier than those experimented on; and they also passed much quicker into the state of pupæ. Thus, while uninjured specimens, which had not cast their last larva skin, all underwent their changes on the 29th and morning of the 30th of May, those of the same age that had been first subjected to experiment did not undergo a corresponding change of skin until late on the 31st. Precisely the same thing occurred with the more matured larvæ, all of which were retarded in their change to the pupa state beyond the time at which others of the same age entered it.

It was thus evident that although mutilations do not necessarily prevent, they certainly arrest the natural period of change, both as regards that of the larva, and also its passing into the pupa state.

I have already stated that at the commencement of the eighth day from the operation, May 31st, only five specimens remained out of the twelve of the younger individuals first operated on. At this time they entered their last skin as larvæ. The condition of these specimens after casting their skins was exceedingly interesting. One of them had had the whole of the three legs on the left side of the body either partially or entirely removed. This individual changed its skin during the time I was watching it. No hæmorrhage whatever occurred from either of the injured limbs, the wounds in which had become completely healed. But no new legs had yet been formed, although there were indications that new parts might perhaps make their appearance at the next change, as the basal joint of each leg had become slightly elongated. In a second specimen the intermediate leg on the left side had been removed almost close to the body, and the remains of the basal joint in this also was slightly enlarged. In a third instance the intermediate leg on the left side had been cut off quite close to the body, and yet the larva had undergone its change without any hæmorrhage; the wound was completely healed, but there was scarcely any development of the injured surface. In the fourth example also the first and second

legs on the left side had been cut close off, but the basilar joints in these were elongated, and the insect cast its skin without difficulty. In the fifth specimen, which cast its skin during the very moment I was examining it, the facts were still more satisfactory. The middle leg on the left side had been removed, but the basilar joint, as in the other instances, had become elongated. Besides this, a portion of the posterior leg on the same side had been removed at the tibial joint, and this *had now been reproduced with the tarsus and claw*. It now formed a short leg, very obtuse at its extremity, with the minute black claw sunk in its apex. This fact sufficiently proved to me that a power of reproduction exists in insects which undergo a complete metamorphosis, as well as in those which do not change their form, and it led me to watch with greater assiduity the passing of these individuals into the pupa state.

At the expiration of nine days from the commencement of the experiments (June 1st), one of the larvæ, that was nearly full-grown when operated on, suspended itself to enter the pupa state. At that time there were only seventeen specimens still living out of the twenty-eight originally employed, and four of these died soon after. There then remained two of the oldest, six of the next age, and, as above stated, five of the youngest. The eight oldest specimens had all changed to pupæ by the 5th of June; but the remaining five continued to feed until the 6th, between which and the 9th, the seventeenth day after the operation, these also had become pupæ. I was now much gratified to find that most of them gave distinct evidence of reproduction having taken place. In some of them the *tibial* and *tarsal portions* of the legs had been restored; in others *entire limbs had been reproduced* (fig. 5. *f. g.*), while in two or three instances the experiment appeared to have entirely failed. I waited, therefore, with much eagerness for the development of the perfect insects.

The first specimen came forth early on the morning of the 14th of June, the twenty-second of the experiment, having remained in the pupa state only eleven days and seventeen hours, during which the temperature had ranged from 61° Fahr., at which it entered the pupa state, to 76° Fahr., being 71° Fahr. at the time the insect came forth; from that time to the 17th of June, the twenty-fifth of the experiment, eight perfect insects made their appearance. The longest period that any of them remained in the pupa state was eleven days seventeen hours, and the shortest ten days fourteen hours; thus most directly proving the influence of increased temperature in hastening development; the usual length of time which this insect remains in the pupa state, at a medium temperature of 60° Fahr., being fourteen days. In two of these specimens no reproduction of the limbs had taken place, but in the six remaining ones the reproduction was complete. In one specimen (fig. 6.) the entire intermediate limb had been reproduced (*g*), but it was much smaller than the other limbs. In the other specimens the tibial and tarsal joints had been restored, and always the minute claw. In some instances the tarsal joints were very short, but their number and relative proportions were usually maintained, while in others the tibia was developed to its full extent, but *without its articular spines* (fig. 6 to 13.),

thus coinciding precisely with what I have already stated in regard to the irregular development of the armature of reproduced limbs in the Myriapoda.

The remaining five specimens were developed between the 18th and 20th of June, the last individual having made its appearance at an early hour of the morning of the present day (June 20), having remained eleven days and four hours in the pupa state, which condition it entered at a temperature of 71° Fahr., and left when it was only 63° Fahr. In two of these instances also there was only an abortive attempt at reproduction; the limb was microscopic in size, and imperfect (fig. 15 to 16.), but in the other three the reproduction was very complete.

It is a matter of great interest to ascertain to what the non-production of the legs in some of these instances is to be attributed, while a complete reproduction took place in others. Thus, in the last developed specimen the second leg on the left side was reproduced, but the third one was not. This fact appears at first to support the opinion that the reproduction of lost parts depends on the existence of special structures, situated in some portion of the base of the limb, the removal of which prevents the redevelopment of the lost part. But this conclusion is opposed by the fact, that even in those instances, in these experiments, in which the entire limb, with the coxa or basilar joint was removed, a new limb was afterwards produced, or the merest possible rudiment of a limb was developed, while in others there was no indication of it whatever.

When an entire limb is reproduced it is always composed of its *essential* parts (fig. 4.),—coxa, femur, tibia, tarsus and claw. Besides being inferior in size, the tarsus is often deficient in the number of its joints; and the *subsidiary* parts of the limb, the articular spines, are almost always absent. This is more especially the case when a limb has been divided in the femoral or tibial joints, and the reproduction of the limb has, in consequence, been only partial. But in all of these cases the terminal part of the organ, the *claw*, is invariably reproduced. This was strikingly shown in some specimens of partial reproduction, in which the claw was formed at the extremity of a metatarsal joint, or when one or more of the tarsal joints were wanting.

It is thus sufficiently clear that a power of reproduction of lost parts is common to the whole of the Insecta and Myriapoda; and that it may take place in insects that undergo a complete metamorphosis, as well as in those which do not change their form. It yet remains to be shown in what way this regeneration of parts takes place. The fact that it commences in insects and Myriapoda in any portion of an organ that may be wounded, or that it may occur, as in Spirostreptus and other *Iulidæ*, where the entire organ with its basal portion has been removed, seems to lead to the inference that it is not confined to special parts, but exists equally in the whole of the organized tissues.

The general conclusions to which I have been led by these investigations are,—*First*, that slight wounds of the body in larva are always healed, except when there is any protrusion of the viscera, or, as in the higher Vertebrata, when hæmorrhage

takes place to a very great extent. *Secondly*, that very severe wounds also are frequently healed; as, for instance, those attendant on excision of an entire limb. *Thirdly*, that protrusion of the viscera takes place from small wounds when these are in the line of action of the principal muscles of the body. *Fourthly*, that the healing of wounds in these animals depends, in the first instance, on an arrest of the hæmorrhage by coagulation of the effused blood, and the formation of a clot, as in the Vertebrata. *Fifthly*, that coagulation is a property of the blood in these Articulata, exactly as in the Vertebrata. *Sixthly*, that coagulation is not so complete in the former, but begins to take place in nearly the same time as in the latter. *Seventhly*, that a complete union of the wounded parts takes place beneath the eschar formed by the clot on the wounded part. *Eighthly*, that after this union the injury begins to be repaired by the development from the injured surface, of parts corresponding to those which have been removed. *Ninthly*, that at least one change of skin is necessary to the production of a new limb, when the injury has been severe, or the entire limb has been removed. That the removal and reproduction of a part, and the healing of the wound, do not *prevent*, although they certainly *retard*, the natural changes of the animal; and that reproduction of lost parts takes place in the metabolic as well as in the ametabolic Articulata.

Note.—Since this paper was delivered to the Royal Society I have repeated these experiments on the larvæ of *Vanessa Iö* with precisely similar results. The original specimens illustrating this paper are now in the cabinets of the British Museum, together with others showing the same facts in *V. Iö*.—G. N., Sept. 24, 1844.

Description of Plate.

Fig. 1. Head of *Iulus terrestris* with the right antenna reproduced.
- *a*. The original basal joint.
- *b*. The reproduced joints.—Magnified.

Fig. 2. Head of *Iulus* with the left antenna reproduced.
- *a*. The original basal joint.
- *b*. The reproduced joints.—Magnified.

Fig. 3. Head of *Iulus* with a portion of the left antenna reproduced.
- *c*. The point at which the original antenna was divided, and the reproduction of the new parts commenced.—Magnified.

Fig. 4. *Alopus cocophages*, Gray, MSS. (natural size), with the right anterior leg reproduced.
- *a*. Coxa.
- *b*. Femur.
- *c*. Tibia.
- *d*. Metatarsus.
- *e*. Tarsus
- *f*. Claw. The third tarsal joint in this foot is not developed.

Fig. 5. Front view of a pupa of *Vanessa urticæ* one hour before the development of the perfect insect (fig. 6.), exhibiting the condition of the first and second reproduced legs in the pupa.

a. The antennæ.

b. The palpi.

c. The elongated maxillæ or proboscis.

d. The front.

e. The eyes.

f. The anterior, or palpiform leg of the insect reproduced, and very much the smallest on the left side.

g. The middle, or meso-thoracic leg, reproduced and diminutive on the left side.

i. A deep excavation on the left side of the pupa which the reproduced limbs are too minute to fill up. This specimen is magnified three diameters.

Fig. 6. The under surface of the perfect insect developed from the pupa, fig. 5. (natural size), the letters as before. The reproduced legs 1 and 2 are not more than one-half the size of the corresponding ones on the opposite side. In 2, four of the tarsal joints exist, but are exceedingly minute.

Fig. 7. The meso-thoracic or middle pair of legs in the same insect magnified three diameters.

Fig. 8. Reproduced meso-thoracic leg of another individual a little more complete.

Fig. 9. Reproduced meso-thoracic leg of a third individual, with the whole of the tarsal joints, and nearly perfect, but without the tibial articular spines (*g*).

Fig. 10. Meso-thoracic leg of a fourth individual still more complete, with the claw (*f*) almost as in the normal state. In this instance the leg of the larva was divided in the tibial joint (*c*), and the reproduction commenced in that part, but even in this instance the articular spines (*g*) are absent.

Fig. 11. Leg divided in the tibial joint, in the *fifth stage* of the larva, and reproduction commenced in that part.

Fig. 12. Leg divided in the fifth stage of larva with the claw formed at the extremity of a mesotarsal joint.

Fig. 13. Leg reproduced in the tibial portion, further advanced.

Fig. 14. Abortive attempt at reproduction of the leg in a specimen in which the limb was removed after the larva had entered its fifth stage.

Fig. 15. Abortive attempt at reproduction of the posterior or meta-thoracic leg in a specimen in which the limb was removed while the larva was in its *fourth stage*, and in which an entire new limb (fig. 9.) was formed in the same insect.

Fig. 16. Rudimentary abortive leg in a specimen operated on its fourth stage as a larva.

All the figures from 7 to 16 are magnified three diameters.

X. *On the Comparative Anatomy of the Thyroid Gland. By* JOHN SIMON, *Esq., Assistant-Surgeon to the King's College Hospital, and Demonstrator of Anatomy in King's College. Communicated by* JOSEPH HENRY GREEN, *Esq., F.R.S., Senior Surgeon to St. Thomas's Hospital, Professor of Anatomy to the Royal Academy, &c. &c. &c.*

Received June 11,—Read June 20, 1844.

FEW portions of comparative anatomy appear in a less satisfactory condition than that relating to the organs which have been classed together as glands without ducts. Since any attempt to illustrate the obscure physiology of these bodies must of necessity be founded on a precise knowledge of their distribution in the animal kingdom, the deficiency cannot be considered unimportant; and I accordingly venture to hope that the following details may not appear devoid of interest to the Royal Society.

In recent researches I have had occasion to examine how far the presence of a *thymus gland* extends in the scale of organization: in the present paper I confine myself to the comparative anatomy of the *thyroid body*; and I hope, on some future opportunity, to communicate the result of similar investigations in regard of the remaining two organs of the class, viz. the *spleen* and *supra-renal capsule*.

In pursuing the present subject, and particularly in that part of it which treats of Reptiles, I have been under the greatest obligation to my friend Mr. GRAY of the British Museum, by whose kindness I have enjoyed opportunities of examining many animals which I could not otherwise have procured. I have likewise owed much to the liberality of the Council of the Royal College of Surgeons, who have permitted me access to their rich assortment of store-preparations.

The careful dissections of MECKEL and CUVIER (as recorded in the former's Abhandlungen aus der menschlichen u. vergleichenden Anatomie u. Physiologie, Halle, 1806, and in the latter's celebrated lectures) leave no question as to the universal existence of a thyroid gland in the class of mammiferous animals. It is therefore unnecessary to dwell upon this point, and I proceed at once to consider the anatomy of the gland in the other classes of Vertebrata.

I. *Birds.*

Some writers on the comparative anatomy of Birds have described "two glands, one on each side of the trachea, very near the lower larynx, and frequently attached to the jugular veins; which they regard as the analogues of the thyroid gland*."

* OWEN in Cyclop. of Anat. vol. i. p. 348; CARUS, Vergleich. Anat. § 741.

They were first, I believe, mentioned by Perrault*, and were afterwards described in several genera of Birds by Ballanti† and Uttini. Various later observers have since noticed these bodies; some considering them as thyroid glands; while others, among whom are Meckel, Cuvier and Haugsted, entertain a different opinion of their nature.

In all such uncertainties the microscope is the only conclusive test. By repeated and careful examinations, I have satisfied myself that the ultimate structure of these doubtful organs is identical with that of the thyroid gland in Mammalia. They consist, namely, of a dense aggregation of closed vesicles, whereof each is constituted by a delicate homogeneous membrane, is invested by a close capillary net-work, and contains in its interior either floating cytoblasts, or mature cells, corresponding to those of the true glands.

My dissections of Birds have included all the orders, and, in most instances, several families from each: I have never failed to find the thyroid gland, or to recognise its peculiar structure: I accordingly presume that it is universally present in this class of animals.

Of its relative position it is unnecessary to say much more than is included in the notices of previous observers, and I will merely mention that its relation to the larynx seems neither essential nor constant. A more uniform and more important relation is included in the fact, that the gland always corresponds to a particular spot of the vascular system; namely, that it lies on the cervical vessels, and receives its supply of blood just opposite to the point at which the vertebral and carotid arteries diverge to their respective destinations.

II. *Reptiles.*

It is unaccountable that in this class of animals, where the thyroid gland is universally manifest, it should have been so generally overlooked. Where noticed, it has been, with rare and partial exceptions, either mistaken for the thymus, or confounded with it in a common description.

A. *Chelonia.*

Bojanus, in his excellent monograph on the freshwater Tortoise‡, figures with perfect fidelity the body, which I shall directly mention as the thyroid gland; but he does so under the erroneous impression that it is a thymus, and describes it by this name: Carus§ likewise falls into the same error as to its true nature.

* Déscription de six Otardes, Mém. de l'Acad. t. iii. part 2. p. 319.

† Ballanti states an opinion of their use which has received pretty general sanction:—"quod vocis organo famuletur glandula hujusmodi in animantibus, id videtur satis comprobare ejus sedes, quæ nunquam non est cum eo organo conjuncta;" and Uttini, who continued his researches, specifies this function more exactly, as being "ad vocales chordas opportune emolliendas et humectandas." Comment. Bonon. 1783; De Organo Vocis.

‡ Anat. testudinis Europ. figs. 66, 156, 173.

§ *Op. cit.* § 740.

The position of the thyroid in this order of Reptiles is very definite and uniform; it lies in the median plane of the body, just above the base of the heart, between the right and left carotid arteries. The thymus, for which it has been mistaken, lies away from the median line, along the outer side of the carotid on each side, between it and the subclavian artery.

B. *Emydosauria.*

In this order the thyroid gland is a single rounded organ, situate in the median plane of the body immediately above the base of the heart. A careful dissection in this region will first bring into view the thymus gland, which reaches on each side from just below the skull to within the thorax, and conceals the thyroid by the expansion of its pericardiac lobes in front of the base of the heart; these being drawn aside the thyroid gland will be distinctly seen lying between the two carotid arteries. Carus* notices the elongated thymus of the Crocodile, and proposes the vague opinion that it may perhaps fulfil the double function of thymus and thyroid.

C. *Amphisbænia.*

The thyroid gland in the Amphisbænians occupies exactly the same site and relations as in the true Serpents.

D. *Sauria.*

In this order it is not quite so easy as in the preceding ones to verify the existence of the gland, for it occupies different positions in different families, and is therefore very likely to elude superficial search: in some it is single and mesial, in others double; in some it lies high in the neck, in others low.

1. Among the *Lacertidæ*, the arrangement of the gland is not quite constant for the family. In the true Lizards, and in the Teius, the gland is single, and of considerable transverse diameter, being so situated as to overbridge the trachea a little above the chest: in the Monitors, on the contrary, it is double; one portion is placed on each side of the neck, in front of the carotid artery, and is connected with the inferior extremity of the corresponding half of the thymus gland.

2. Among the *Iguanidæ* likewise the anatomical relations of the gland are not quite uniform: in the *Agamæ* and *Iguanæ* it is single, and lies transversely across the trachea; while in the *Istiurus*, as in the Monitors, it consists of two portions, one lying in front of each carotid low in the neck.

3, 4, 5. Among the *Geckotidæ*, *Chamæleonidæ* and *Scincidæ*, the same general form prevails as in the true Lizards; the gland is single, and elongated transversely so as to reach across the trachea. In the Chamæleon it is rather higher (nearer to the os hyoides) than in the other families, and is overhung by the sacciform dilatation of the larynx. Treviranus†, in his dissection of the *Chamæleo carinatus*, noticed this body, and suggests of it that it "may be compared to a thyroid gland."

* *Op. cit.* § 740.

† Beobachtungen aus der Zootomie, p. 87.

E. *Ophidia.*

In the true Serpents the thymus and thyroid are in such close juxtaposition, and are in many genera so additionally obscured by the presence of a large fat body, that it is not easy to judge, from the vague descriptions of authors, how far the thyroid gland itself has actually been discerned. The organ which Blasius* described as a thymus "vasis circa collum situatis accumbens, firmæ admodum conditionis, hordei magnitudinem vix excedens," was probably the thyroid gland; Charas† likewise figured it faithfully, though with the same mistake as to its nature. Cuvier had certainly dissected it, and describes its exterior conformation with his wonted accuracy, stating his impression that it is "analogous to the thyroid gland."

The following description applies to all the true Serpents:—The gland lies, as in the Crocodile, just above the base of the heart, between the right and left carotid arteries: it is a little hidden by the thymus of each side, which lies on the carotid for some distance from the pericardium upwards; and in those genera which possess a fat body (as is, for example, eminently the case with the Python) this large organ lies conspicuously in front of both the thymus and thyroid.

F. *Batrachia.*

Among Batrachia, Carus‡ has recognized the thyroid glands of the common Frog; but his statement of their nature appears, like most of the opinions I have quoted, to be delivered vaguely and with hesitation. The organs which he represents are unquestionably thyroid glands; they are situated on the carotid arteries, just beside the cornua of the hyoid bone, one on each side. Huschke, in adopting Carus's description, suggests that these bodies probably have their origin in the shrinking of the branchiæ, and he proceeds to apply the theory so obtained to the thyroid gland in other animals, stating the common mode of origin of this organ to lie in the transformation of the branchial arches in the early embryo§. But this hypothesis appears sufficiently refuted by the anatomy of the *Menobranchus lateralis*; for in this perennibranchiate reptile the thyroid gland exists no less certainly than in those which possess the branchial apparatus only for a time. I have found the gland in this animal, consisting of two symmetrical portions connected with the inferior border of the os hyoides, one on each side, at the junction of the body and lateral portions of that bone. In the Menopoma I have likewise detected the gland, occupying nearly the same relative position as in the Menobranchus. In the Siren and Proteus I have had no opportunity of making satisfactory examinations.

In the Salamandridæ the same arrangement prevails as in the Ranidæ.

In the anomalous *Lepidosiren paradoxa* the thyroid gland appears also to exist.

* Anat. Animalium, Amst. 1681.

† Nouvelles Expériences sur la Vipère, ch. v. sect. 3. fig. 2. D.

‡ *Loc. cit.*

§ Oken's Isis, 1826, p. 621.

Bischoff, in his elaborate dissection of that animal*, discovered a minute glandular organ, adjoining the anterior extremity of each isolated cornu of the os hyoides, and inclined to consider it as a salivary gland. I have had no opportunity of examining this rare reptile, but Bischoff's account is so complete and circumstantial as almost to supply the absence of personal observation. The minute body in question cannot be viewed as a salivary gland, for it is expressly stated by Bischoff to be destitute of an excretory duct. This last point almost decides its true place in the animal economy; and further, its position, in regard to the hyoid bone, is so exactly that occupied by the thyroid gland in the Menopoma and Menobranchus, that (from Bischoff's description) I cannot hesitate in ascribing to it the same nature.

III. *Fishes.*

I am not aware that any author has hitherto suggested the possible existence of a thyroid gland amongst this class of vertebrate animals.

In many fishes it is undoubtedly present; I have found it in the Carp (*Cyprinus*), Anableps†, Pike (*Esox*), Exocetus†, Cod (*Gadus*), Haddock (*Morrhua*), Whiting (*Merlangus*), Eel (*Anguilla*), Sturgeon (*Acipenser*), Callorhynchus†, Shark (*Squalus*), Skate (*Raia*), and questionably in the Lamprey (*Petromyzon*).

It has appeared, on the other hand, to be absent in the Perch (*Perca*), Mullet (*Mugil*), Gurnard (*Trigla*), Mackerel (*Scomber*), Tench (*Tinca*), Salmon (*Salmo*), Trout (*Salmo fario*), Herring (*Clupea*), Plaice (*Pleuronectes*), Holibut (*Hippoglossus*), Turbot (*Rhombus*), Sole (*Solea*), Cyclopterus, Gymnotus and Balistes†.

This part of my inquiry has been attended with extreme difficulty. According to varying circumstances the gland may occupy any one of three different positions;—these positions, moreover, related to each other (as would appear at first sight) by no very obvious analogy. It was long after discovering a thyroid gland in the Skate, and vainly searching for it in the corresponding region of the body in other fishes, that a second probable spot occurred to me, in which I succeeded in finding the gland in the Cod, Haddock and Whiting; and it was yet longer before I ascertained the organ's third occasional site. Such having been the case, it has of course been no easy matter to arrive at trustworthy results as to the absence or presence of the gland in each particular instance. In forming the negative conclusion, there was always some fear of having overlooked the organ,—always some doubt of its occupying an unexplored space. The positive certainty, which alone is valuable in investigations of this nature, cannot often be derived from examining preparations preserved in spirit; and, therefore, although I have made many such dissections, I refer to

* Lepidos. Parad. anatomisch untersucht und beschrieben, Leipzig, 1840.

† In those marked by a dagger, I have been obliged to trust to preparations preserved in spirit; and these dissections—especially with a negative result—are never quite so satisfactory as if performed on the recent body of the animal.

them in very few instances, and draw my inferences from those only which I can quote with entire confidence.

The positions in which I have found the gland are the following, viz.—

1. In those cartilaginous fishes* which possess it, as likewise in the Eel, it is a single organ, and is situated in the median line, in connexion with the anterior surface of the cartilages, which bind together the branchial arches of the opposite sides of the body. Within this line it may be more or less removed from the mouth of the animal, sometimes advancing so far upward as to come into contact with the lingual bone; but its position is always defined, as the spot where the great trunk of the branchial aorta distributes its terminal branches. It lies in the angle of this bifurcation, and sometimes (as in the Sturgeon) extends some little way behind it; it is covered by the sterno-hyoid or sterno-maxillary muscle, and also by the mylo-hyoid and genio-hyoid, when these are present. Situated at the anterior extremity of the first branchial arch, it receives its supply of blood by means of a recurrent branch given off in this direction by the first branchial vein, while yet within the gill. It never receives the smallest share of supply from the branchial artery with which it is in contact.

2. In the *Gadidæ* the gland is double; one portion lies on each side, not as in the last case, at the anterior extremity of the first branchial arch, but near its posterior or vertebral end. Here it occupies part of a recess which is bounded by the gill below, and above by the outer extremity of that transverse fold of mucous membrane which limits the extent of the palate; it is merely covered by mucous membrane, which leaves it apparent to the eye without need of any express dissection. Its vascular supply is reflected to it from the ophthalmic artery, which arises, before the formation of the systemic aorta, from the first branchial vein close to the origin of the proper encephalic artery.

3. In the Carp, Anableps, Pike and Exocetus, the gland is placed at the inner extremity of the same duplicature of mucous membrane, and more toward the palate, so as to lie upon the fibres of the pterygoid muscle. It requires more dissection, in order to be made apparent; in the Carp especially it is at considerable depth, being hidden by the extraordinary thickness of the soft palate, and imbedded between the surface of the pterygoid muscle and the outer extremity of the branchial bone.

Amid these differences in the relative anatomy of the gland there is constancy in respect of one point, which I am inclined to consider essential; the organ, whether placed in the median plane or otherwise, whether at the vertebral, or at the hyoidal extremity of the gill, is always so placed as to receive its blood from the first bran-

* The questionable trace of a thyroid, noticed in the *Petromyzon marinus*, was in a depression of the base of the skull, between the palate and the posterior confluence of the branchial veins; it would resemble the above in being single, but otherwise would be nearer to the thyroids of the osseous fishes.

chial vein, and is thus brought into connexion with the encephalic nervous centre by a certain community of vascular supply.

Nothing could at first sight appear more capricious and uncertain than the presence of the gland in fishes; it would seem almost hopeless to account for its being found in the Carp, yet not in the Tench; in the Eel, yet not in the Gymnotus, &c. Further research, however, tends to justify the belief that its distribution is governed by a simple and uniform law; namely, by the existence or non-existence of another organ, with which its presence alternates. Since this law, if discoverable, must be an important step toward ascertaining the function of the thyroid gland, I beg leave to offer a few observations on the organ alluded to.

In many fishes (take for instance any one of our common Acanthopterygii or Pleuronectæ) there exists a peculiar appendage to the branchial apparatus, first described by Broussonet*, and subsequently with more detail by Meckel†. It has the aspect of a minute supplementary gill, and is situated between the outer extremity of the palatine duplicature of mucous membrane on the one hand, and the dorsal attachment of the first true gill on the other‡. It must not be confounded with the large opercular gill, found in some fishes (as for instance very largely in the Sturgeon), from which it essentially differs.

The vascular supply of this small appendage is a point of extreme interest in its history. Its vessels communicate on the one hand with the systemic veins about the base of the cranium, on the other, by a single long trunk with the first branchial vein. Rathke§ and Cuvier‖ consider the former to be its afferent, the latter its efferent vessel. But it surely must be erroneous to describe any part of the circulation in a fish as *commencing in a systemic vein, and attaining a branchial vein without having previously traversed the heart*: and I cannot doubt that the supply of this branchiola is after the analogy of organs in the systemic circulation,—that it commences, namely, in the branchial vein, and terminates in those veins which are conveying blood to the heart¶.

The supplementary gill occupies in those fishes which possess it, exactly the same relative position as the thyroid gland in the sub-brachian Malacopterygii: a careless examination of the Cod, Haddock, or Whiting, where the gland shines through the membrane, might almost lead an observer to suppose that the supplemental branchia was there, as in the Pleuronectæ; so similar is the arrangement in the two cases. Equally exact, according to the above argument, would be the agreement of the two

* Mém. de l'Acad., 1785, p. 174. † Vergleich. Anat. vol. vi. p. 179.

‡ It is often a little obscured by the free edge of the palate overhanging it.

§ Über den Kiemen-apparat und das Zungenbein, 1832, p. 53. ‖ Anat. Comp.

¶ The supplemental gill, like the thyroid gland, never derives a branch from the branchial artery; injection driven by the bulbus arteriosus never directly reaches it; but it admits of ready and complete injection by the systemic aorta.

organs in respect of their vascular supply; both deriving their afflux of blood from the first branchial vein, both rendering it up again by the readiest channel toward the heart, both as it were participating in the cerebral circulation.

But (it may be contended) this arrangement, which is comprehensible for the gland, is not equally so for the gill; why should this organ, which, in regard of structure at least, is clearly branchial, derive its supply of blood from a stream no longer requiring aëration? It cannot assist the respiratory process, which is already accomplished for the blood arriving there: it cannot do more than maintain the previous oxygenisation of the fluid which traverses it. I can conceive no other theory for the supplemental gill, in agreement with the preceding facts, than one which interprets it as a diverticular appendage to the first branchial vein, and contemplates its uses in reference to the parts supplied by that vessel.

Such then is the organ which,—obtaining the same nutritive supply as the thyroid gland, and occupying a correspondent position,—found only where that gland is absent, absent only where *it* is found,—may fitly be considered as its partial and rudimentary representative*.

The general results of the preceding inquiry are as follows; viz.

1. The thyroid gland, or an organ representing its place and office, may be found in *all vertebrate animals.*

2. It does not appear (as is the case with some organs) to belong to these animals, merely in behoof of the greater *general* completeness of their organization; but seems to have particular reference to that *specific character*, which binds them together as a natural section of the animal kingdom,—namely, the aggregation and more perfect development of their nervous centres; for

3. The gland, shifting its position most variously, yet always maintains an intimate *relation to the vascular supply of the brain*; always is so nourished that it can alternate a greater or less nutrition, according to the activity or repose of that nervous centre.

4. The organ, which in certain fishes represents a rudimental form of the thyroid, is plainly a mere *diverticulum* to the cerebral circulation: in the remaining fishes (where a more perfect thyroid exists), as likewise in the ascending scale of vertebrate animals, there is no essential change from the vascular organization of the branchiola; there is simply the super-addition of a glandular structure. The thyroid is but a higher development of the branchiola: what was a mere capillary plexus, now has gland-cells intermingled with its texture. Probably then the use of the secretory actions occurring in the thyroid gland is to be found in harmony with the obvious

* The Sturgeon, in addition to its thyroid, has a very small supplementary gill; so small, however, and so rudimentary, that this fish cannot be considered an exception to the general rule, but rather as an additional confirmation of its accuracy.

intention of its vascular supply; as the latter is diverticular, so we may expect the former to be vicarious, or alternative.

Such are the conclusions which Comparative Anatomy may warrant, and beyond these the proposed scope of the present paper does not permit me to advance. I would but in ending remark, that the views here suggested seem to me to receive equal sanction when contemplated in the light of the other physiological sciences. The peculiarly occasional and intermitting character of the cerebral functions,—the morphology of the thyroid gland, and its evident adaptation (as I have elsewhere shown) for a merely temporary, and, as it were, alternative secretion,—the known ability of arteries to regulate and proportion the supply of blood transmitted through them,—the diseases of the gland,—its turgid throbbing in hysterical lipothymia,—the mysterious relation of goître and cretinism;—these are topics on which it would be inconvenient now to dwell, but a glance at which is sufficient to show that comparative anatomy by no means exhausts the available arguments for the connexion suggested.

XI. *Researches into the Structure and Development of a newly discovered Parasitic Animalcule of the Human Skin—the* Entozoon folliculorum. *By* Erasmus Wilson, *Esq., Lecturer on Anatomy and Physiology in the Middlesex Hospital. Communicated by* Robert Bentley Todd, *M.D., F.R.S.*

Received November 23, 1843,—Read December 14, 1843.

In the June Number of Muller's Archiv (for 1842) there appeared a paper from the pen of Dr. Simon of Berlin, announcing the discovery of certain animalcules, which he regarded as Acari, in the sebaceous substance of the follicles of the human skin. After perusing his account of these singular creatures I was induced to engage in the inquiry, and was so much interested in what I saw, that I devoted six months of exclusive labour to the study of their structure and mode of development. The result of my research is at variance with the description of their structure given by Dr. Simon; it corroborates Dr. Simon only in the general fact of the existence of these animals and their diversity of form, while it offers several new and original observations for consideration. Among the latter I may refer especially to the anatomy of the head, which Dr. Simon regards as composed of certain moveable organs, but which in reality is distinct from those organs; the discovery of eyes; of a power of retracting the head within the thorax; of ova; of a remarkable embryonic form; and of the progressive development of the young animal.

The situation of the animalcule in the zoological system is a question still to be determined, and it is one on which I have felt unwilling to speculate until a complete description of the creature shall have been placed before scientific entomologists. The name given to the animal by Dr. Erichson of Berlin and adopted by Dr. Simon, namely *Acarus folliculorum*, is founded on the erroneous view of the anatomy of the head and mouth, put forth by the latter gentleman. The animal is not an *Acarus*, for it has no haustellum; nor is it an *Arachnidan*, for it possesses a distinct head, susceptible of retraction within the thorax, and an abdomen most indubitably annelidous in structure. Under these circumstances I have followed, in the present paper, the suggestion of Dr. Todd, and have made use of the term Entozoon, signifying merely an inhabitant of the interior of the body, as a temporary appellation, until a better and more suitable one shall have been invented.

The *Entozoon folliculorum* is found in the sebaceous substance of the hair-follicles; it feeds upon the secretion contained within the sebaceous cells, and its young are produced from ova in the midst of the sebaceous matter. The presence of these animalcules has no reference to disease of the skin or of the follicles; they are met with

in almost every person, but are most numerous in those in whom the skin is naturally torpid, in invalids, and in the sick. Their numbers are various; in some persons not more than two or three can be found in a follicle, while in others I have seen upwards of fifteen, indeed the follicle has been completely distended by them. Their position within the follicle is peculiar, the head is always directed inwards, while the tail is directed in the opposite sense; and when a number are present, they have the appearance of being collected into a conical bundle, the large end of the cone being formed by the heads. The situation in which these little animals are most commonly found is the integument of the face, and more particularly that of the nose, but I have also met with them in the follicles of the back, and of the breast and abdomen; I have not yet found them on the limbs.

As regards the size and form of the animalcules there is considerable variety, some of the differences being referrible to growth and development, and others amounting to a specific distinction. They pass their whole existence in the sebaceous substance, undergoing ecdysis repeatedly during their development and growth; and are finally expelled from the follicles with the secretion of those organs. For examination, they are obtained by compressing a follicle and placing the small mass which escapes from its aperture in a drop of olive oil between two plates of thin glass. By a slight movement of the glasses the sebaceous matter may be broken up and distributed without injury to the animalcules, but if much pressure be employed, they will be in danger of being crushed. When prepared in this manner, they may be seen to move with activity for many hours, and they are so tenacious of vitality that I have found them alive in a subject in the dissecting room that had been dead for fourteen days. They are seen very distinctly with an object-glass magnifying fifty diameters.

The perfect animal may be known by the following typical characters: it is elongated in figure, being several times longer than the breadth of its body; and is divisible into a head, thorax and abdomen; the head being more distinct from the thorax than the latter from the abdomen.

The head is subconical in form, obtusely truncated anteriorly and depressed. It is connected with the thorax by means of a narrow segment formed by a fold of integument, and can be withdrawn within the thorax so as to be completely buried from sight. When the head is protruded the outline of the narrow segment is distinguished by two slight grooves, which are seen with the microscope as boundary lines; but when the head is retracted the segment is seen as a thick folded border, which constitutes the anterior extremity of the animal.

The truncated extremity of the head is composed of two moveable, arm-like organs, which lie side by side, and together with two intermediate antennæ-like organs, constitute the entire breadth of the snout. The cephalic arm-like organs or palpi are cylindrical at their bases, where they are continuous with the general tegument of the head, and become somewhat smaller and prismoid towards their distal end. In the latter situation they are truncated and present a flattened extremity. They appear

to be formed by a bifurcation of the head and by the prolongation forwards of the divided portions, to an extent which is about equal to one third of the length of the head. In structure, the cephalic palpi are composed of three or four annulate segments connected by capsular membranes, the last segment or carpus having its flat and triangular palm furnished with four or five membranous claw-like phalanges with obtusely pointed extremities. On the outer angle of the penultimate segment is a prominent tubercle, which has the direction of the axis of the arm. The cephalic palpi are furnished in their interior with muscular fibres, which form a thin stratum beneath the integument, and are continuous posteriorly with the general muscular system of the animal. Of this muscular apparatus, the flexor and extensor fibres are most strongly marked.

The motions of the cephalic palpi are extensive and powerful in the direction of flexion and extension, but very limited in the sense of abduction. By virtue of the laxity of the capsular membranes of their annulate segments, they also admit of retraction. The actions of flexion and extension aid the animal in progression, and in consequence of the inward obliquity of their movement, they also serve the office of organs of prehension, by conveying directly to their mouth portions of sebaceous substance, from which the animal may suck the juices.

The upper surface of the head is depressed, sloping gradually downwards and forwards from the occiput to the extremity of the snout, which is either curved suddenly downwards or slightly upwards, according as the animal is seen in the state of flexion or extension of its cephalic palpi. Along the middle of the head in its longitudinal axis is a slight groove caused by the prominence on each side of the cephalic palpi; and lodged in this groove is a flask-shaped flattened organ (labrum?) which forms a part of the base of the head behind, and terminates anteriorly opposite the bifurcation of the cephalic palpi in a linguiform point. The flask-shaped organ is slightly curved in its form; its upper surface being smooth and convex, the under concave. From the concave under surface there appear to proceed four pairs of jointed tentacula, which in the first instance pass forwards, and becoming perceptible beyond the end of the flask-shaped organ, give rise to the appearance of a succession of progressively diminishing rounded segments, and then bend downwards to either side of the mouth of the animal. Proceeding also from this organ as far back as the base of the neck of the flask are two larger, antennæ-like tentacula, which seem to arise from its under part at each side and run forwards parallel with the neck of the flask and its segmented prolongation. Immediately in front of the latter, the larger pair of tentacula approximate and pass onwards parallel with each other to near the extremity of the snout, where they curve downwards and backwards to the front of the mouth. These tentacula are slightly constricted from point to point, the constrictions probably performing the office of joints, and at their termination are slightly curved outwards. They are capable of a moderate degree of movement in the direction of flexion and extension.

The flask-shaped flattened organ terminates posteriorly in a narrow elongated process which is received between two oval, flattened organs within the head, and these latter are connected with two large reniform organs which constitute the bulk of the head. Moreover, it is to these oval-shaped organs that the muscular apparatus intended to retract the head is attached. The oval-shaped organs are marked in the middle by a small indistinct circle, and on each side by a dark spot, produced apparently by a deposit of pigmentary matter.

On the under surface of the head in the middle line, and occupying the anterior half of its length, is an oblong opening, the mouth; it is surrounded in front and on the sides by a broad and raised border, consisting of a number of tentacula, four pairs of which may be distinguished as being superior and three inferior. There are consequently no less than sixteen tentacula surrounding the aperture of the mouth; the central pair, or antennæ-like tentacula, proceed, as I have before remarked, by the side of the neck of the flask-shaped organ, while the four remaining pairs appear to originate from the under surface of that organ. The three pairs of inferior tentacula are productions of the integument from the posterior boundary of the mouth, the external pair being the longest, and the innermost pair merely rudimentary. Behind the mouth the boundaries of the pharynx are seen through the transparent integument.

The tentacula are capable both of lateral and central approximation, and by these movements effect a closure of the aperture of the mouth. They cooperate in the act of prehension and detention of food, and by their close contact constitute a temporary haustellum by which the fluids of the nutritive mass are expressed and imbibed by the animal.

Immediately within the tentacula are situated a considerable number, probably from four to ten pairs, of maxillæ which form an internal border to the mouth. The maxillæ are elongated cylindriform organs, projecting by their free extremity one beyond the other along the border of the mouth, from its posterior to its anterior boundary, and corresponding by their axes with that of the head. They are apparently attached to the pair of large reniform bodies which form the principal bulk of the head, and by their shafts constitute the walls of the pharynx.

The maxillæ, like the tentacula, are capable of close approximation, both in the lateral and central direction, and are consequently well adapted to assist the latter in the office of suction, and at the same time to masticate substances presented to them by the tentacula. In the latter action the tentacula would hold the nutritive substance, while the maxillæ are engaged in its trituration and deglutition.

Within the head, and constituting the bulk of this part of the animal, are two oval-shaped or reniform bodies of an opake white colour. These bodies are slightly flattened from above downwards in conformity with the shape of the head; they are broad in front, somewhat narrower behind, where they are separated by a narrow interspace, convex on their outer border, and flattened on the middle line. In the

latter situation they are excavated in front to form the pharynx, and behind the mouth appear to be continuous for a short extent by means of an isthmus of communication. When these bodies are examined on the upper surface, a dark globular body will be seen to be imbedded in the substance of each near its anterior extremity. This globular body is an eye of the simple kind, and is surrounded by a circular line representing an orbit. On the middle line the mode of junction of the reniform bodies is concealed by the flask-shaped organ, and posteriorly it is to these bodies that the oval-shaped pieces of the flask-shaped organ are attached.

These reniform bodies constitute, as I have before remarked, the essential part of the bulk of the head; they give support to the eyeballs; they form the pharynx; they afford a point of connection to the maxillæ, and by means of the flask-shaped cephalic organ, they give attachment also to the superior tentacula. When retracted into the cavity of the thorax, these bodies may be very distinctly seen through its thin and transparent integument. Besides the movement of retraction within the thorax, the head admits of flexion and extension, and of a lateral flexion produced by rotation on its own axis. The thorax is the largest and broadest part of the animal; it is flattened upon its ventral surface, convex on its dorsal and lateral surfaces, narrower in front than behind, and somewhat larger toward the middle than at either extremity. It is composed of four broad and continuous annular segments, which are distinguished on the ventral surface of the thorax or breast by four strongly-marked transverse lines, and on the dorsal surface by as many broad and shallow transverse grooves. These shallow grooves are produced by a convexity of each of the segments from before backwards; they correspond inferiorly with the spaces between the legs, while the convex portion of each segment is on a line with the attachment of the legs. With the ventral surface of each of these segments on each side of the breast, the four pairs of legs of the animal are articulated.

The ventral surface of the thorax is flattened, and the epidermic covering is thicker in this situation than on the rest of the body. Running along the middle line of the breast, the whole extent of the thorax, is a double line (sternum) formed by two ridges which are broken at short distances and are continuous with the four transverse thoracic lines. The latter also consist of double ridges and run outwards, forming the boundary mark between the thoracic segments. The most anterior of the transverse ridges commence at the extremity of the median ridge, and pass obliquely forwards and outwards at each side to the space between the base of the anterior leg and the collar of the neck, forming the anterior boundary of the thorax on its ventral aspect. These ridges are slightly curved in their course, the convexity being directed forwards, and taken together, give the idea of a bifurcation of the median ridge anteriorly. The second pair of ridges pass nearly horizontally outwards to the groove between the first and second pair of legs making a very gentle curve, the convexity of which is directed backwards. The third pair of ridges are more horizontal in their direction than the preceding, and run to the groove between

the second and third pair of legs, also forming a gentle curve, whose convexity is backwards. The fourth pair of ridges proceed obliquely outwards and backwards on each side, and terminate at the groove between the third and fourth pair of legs. There is no line of separation between the thorax and abdomen, and the median ridges gradually diminish in their prominence on the last thoracic segment, until at the boundary of the latter they are lost. The spaces of the breast included between the transverse ridges in front and behind, and the median ridge and base of the legs laterally, are irregularly quadrangular in form, and increase in breadth from before backwards in consequence of the greater separation between the legs.

The lateral and dorsal portion of the thoracic segments is marked on its surface by a number of transverse lines situated at minute but regular distances. The spaces between these lines represent so many narrow plates which are unbroken from the base of the lateral portion of each thoracic segment across to a similar point on the opposite side, and overlap each other slightly from before backwards. On the convexities of the thoracic segments on each side, near their bases, the plates converge and become more imbricated than in their upper portion. By this arrangement a small triangular interval is left in the concavities of the segments which is occupied by short supplementary plates.

The thorax admits of flexion to a limited extent, both in the antero-posterior and in the lateral direction, and of a slight degree of retraction in the longitudinal axis.

The legs are four in number on each side; in general form they are conical, broad at their bases, where they are attached to the side of the under part of the thorax, and truncated at their free extremities. They are composed of three segments; the proximal segment covers by its articulation a considerable expanse of surface, extending for some distance inwards upon the breast, and outwards upon the side of the thorax. In longitudinal extent it occupies very nearly the entire breadth of the thoracic plate. This segment resembles in its form the base of a cone obliquely truncated from before backwards; its anterior depth being considerable and the posterior very narrow. On the outer side of this segment, and along its base and inferior border, are situated several spinous tubercles, and at the extremity of the anterior margin is one of larger size than the rest; it is curved backwards. The proximal segment is articulated with the thorax by means of a loose capsular membrane, which permits of a trifling degree of retraction of the segment within the cavity of the thorax, and also allows of a slight degree of motion in all directions; the principal movement of the segment being forwards and backwards. The middle segment is a cylindrical piece articulated with the preceding by means of an exceedingly loose capsular membrane. Its movements are flexion and extension in the antero-posterior direction, and retraction to a considerable degree. The antero-posterior movements are very extensive; the former almost buries the middle in the superior segment, approximates the third piece and recurved tubercle of the anterior border of the proximal segment, and performs a sharp, angular flexion posteriorly;

while the latter directs the middle piece nearly horizontally backwards, and converts the posterior projecting angle into a receding angle. The capsular membrane of this articulation during the movements of the segment, is raised into a fold on the side corresponding with extension, and reminds one very forcibly of the analogous manner of articulation of the crural segments in the Lobster. The third segment is short, and admits at a very trifling extent of movement on the extremity of the middle piece. It is flat on its distal surface, and provided with seven or eight digital processes or phalanges, which during the movements of the limb, are one while drawn together and straightened so as to have the appearance of a single conical point, and another while separated and curved, so as to resemble a number of hook-shaped claws. The latter is their more frequent condition.

The contents of the thorax are very indistinct, on account of the general transparency of the animal, and I have been quite unable to detect anything like a proper organ. On two occasions I saw some granules rising and falling in a central direction, being bounded on each side by a faint longitudinal line; this I conceived to be some alimentary substance moving in the œsophagus. The difficulty of perceiving any organ within the thorax is moreover increased by the presence of numerous adipose vesicles which constitute the subtegumentary tissue. On bringing the interior of the thorax to a focus, some faint waving lines may be seen along the sides of that cavity; these are the muscles of the legs, and they are continuous with the retractor muscles of the head; the latter appear to be attached to two ridges which project from the upper and lateral part of the two first thoracic segments. In the upper and anterior part of the thorax I have observed pretty constantly a transparent spot that seems to be an unoccupied space, bounded by the substance of the animal below and by the vaulted transparent integument above. This space has reference to the retraction of the head within the thorax.

The abdomen is the largest of the three divisions of the body, usually several times longer than the thorax, but somewhat smaller in diameter at its commencement than the latter, and tapering more or less to its termination. Its form is that of a cylinder slightly compressed from above downwards, being flatter on its under than its upper surface. The integument of the abdomen is composed of narrow annular segments which overlap each other from before backwards, and become narrower towards its extremity. These segments have a beautiful appearance when seen with the microscope, and give the idea of an exceedingly delicate coat of plait armour. When examined along the edge of the abdomen they exhibit a serrated outline, the serrations being sharp and accurately defined. Upon the under surface of the abdomen, close to its extremity, is a small opening which sometimes appears circular and sometimes elliptical in shape, the long diameter of the ellipsis being directed transversely; this is the anus.

The segmented structure of the abdomen permits of flexion of this part of the animal in every direction, namely, forwards, backwards, and laterally. Indeed, when

the abdomen is long, it is frequently seen to present a succession of curves and to assume an undulated position. Besides flexion, the abdomen is capable of contraction both in the longitudinal and horizontal direction. I have sometimes seen one or two horizontal contractions which have straitened the diameter of the cylinder very considerably, and have given it the appearance of being tightly constricted by a string.

The structure of the interior of the abdomen, like that of the thorax, is difficult to determine, on account of the extreme transparency of the animal and great number of adipose vesicles which, in clusters of various sizes, form the subcutaneous stratum. Externally to this stratum is a thin membrane which lines the epidermic case, and which, under compression, I have sometimes seen separated to a greater or less extent from the latter. The more general appearances of the abdominal contents are,—a large, rounded or oblong mass of a light brown colour, situated close to the thoracic extremity; another light brown mass at about one third from the extremity of the tail; an irregular cellular mass between the two former, and a transparent portion at the caudal end. The most anterior of these masses is composed of nucleated granules; in one instance it presented a distinct pouch-like figure with well-defined boundaries, but more usually it is irregular in form, sometimes extending for a short distance into the thorax, and at other times being prolonged by a pointed process backwards. Whatever its form, it is traversed through the middle by a curved, cylindrical canal, which appears to represent the stomach, the dark granules being very probably hepatic corpuscles. The cellular mass which succeeds the gastric organ consists of an assemblage of transparent vesicles of various magnitude, some large and some small.. In the midst of these the alimentary canal may generally be traced as a slightly shaded band, somewhat curved in its course. The third mass, namely, that which occupies the commencement of the posterior third of the abdomen, is composed, like the first, of nucleated granules or cells: this mass is smaller than the first; I have been unable to trace the alimentary canal through it, and I am inclined to regard the granules as constituting the ovarium. The remaining part of the abdomen I have described as being transparent and empty of granules; this, however, is not constantly the case, for the granules sometimes extend to the very extremity of the abdomen. In a few instances I thought that I could perceive the latter part of the alimentary canal passing through this part of the animal and terminating by a dilated cloaca at the anal aperture.

In the course of my observations on the *Entozoon folliculorum*, I have distinguished two principal varieties of the adult animal which are marked by strongly characteristic, if not by specific features. The first of these is of large size, fine proportions, and is remarkable for the great length of its abdomen and the roundness of its caudal extremity. The second is characterized by a certain degree of clumsiness of form, shortness of abdomen, and pointedness of the caudal extremity.

The *long* form varies in size from the $\frac{1}{100}$ to the $\frac{1}{48}$ of an inch in length; the latter measurement, that is, somewhat more than a quarter of a line, being that of the

longest specimen I have seen. The body of this animal, from the snout to the base of its posterior legs, measured $\frac{1}{350}$, and the greatest breadth of the thorax $\frac{1}{500}$ of an inch. Of the smallest there were two specimens, of which the same measurements were—

Entire length.	Length of body.	Greatest breadth.
$\frac{1}{100}$	$\frac{1}{280}$	$\frac{1}{480}$
$\frac{1}{100}$	$\frac{1}{313}$	$\frac{1}{533}$

Of fifty specimens, the largest number measured in extreme length from $\frac{1}{70}$ to $\frac{1}{80}$ of an inch. In length of body the greatest number measured (in round numbers) $\frac{1}{275}$, in length of head $\frac{1}{1000}$, and in greatest breadth $\frac{1}{500}$ of an inch.

The *short* form varies in extreme length from $\frac{1}{180}$ to $\frac{1}{100}$ of an inch. The shortest specimen that I have met with measured in length, namely, from the snout to the base of the posterior legs, $\frac{1}{350}$, and in greatest breadth, $\frac{1}{550}$. The longest, namely, that which measured in extreme length $\frac{1}{100}$, measured in length of body $\frac{1}{345}$, and in greatest breadth $\frac{1}{350}$ of an inch.

Turning my attention to the development and mode of growth of the Entozoon, I met with some curious results,—results that led me to the conclusion that the two varieties are developed in a manner peculiar to each; that both proceed from ova, but that the larger kind pass through an intermediate developmental form in which the shorter do not participate. Probably this peculiarity may depend on some unknown modification of the elements of nutrition, and, very possibly, on the same cause with that which determines the greater length of the animalcule. In reflecting on this peculiarity I was reminded of the modification which the young of the common earth-worm presents in a soil of variable tenacity, in the one case being extruded from the oviduct of the parent surrounded by a nidamental covering, and in the other in its perfect state. Here is an important modification having reference to the security of the young; the peculiarities in development of this Entozoon may have an analogous purpose.

The ova of the *Entozoon folliculorum* are bodies of considerable size, and, as I failed in discovering any body of similar proportions within the abdomina of the many hundred animals which I have examined, I came to the conclusion that in their earlier state they were the nucleated cells which so commonly formed a cluster within the caudal extremity of the abdomen, and that these cells underwent development out of the body of the animal. I was strengthened in this view by occasionally finding small masses of these cells in the neighbourhood of the Entozoon. These masses were of an amber colour, and composed of nucleated cells, each of which measured about $\frac{1}{3500}$ of an inch in the long and about one-fourth less in the short diameter. In the vicinity of the masses of small cells I frequently saw cells of somewhat larger size (Plate XVI. fig. 12.) composed of secondary cells, and others, of a more or less oval shape, containing within their investing membrane secondary nucleated cells of various size and in considerable number (Plate XVII. fig. 13.). The measurement of

the latter bodies (transition ova) varied between $\frac{1}{1067}$ and $\frac{1}{1000}$ of an inch in the short diameter, and $\frac{1}{1350}$ and $\frac{1}{789}$ in the long axis. The perfect ova are oval in shape, somewhat larger at one end than at the other, about twice the length of their breadth, semitransparent, amber coloured, and composed of nucleated granules or cells inclosed in a thin and yielding membrane. They vary in length from $\frac{1}{500}$ to $\frac{1}{330}$, and in breadth from $\frac{1}{833}$ to $\frac{1}{585}$ of an inch.

The first developmental change observable in the ovum is the disintegration of the tesselated plane of nucleated cells which constitute the surface of the ovum, and lie in contact with its investing membrane. These cells, which are at first polygonal in form, become rounded and larger in size, and the cells of the centre of the ovum acquire a considerable preponderance in bulk over those of the periphery. Subsequently to these changes the cells assume a special arrangement, they become aggregated into a small oblong mass, which is curved at each end, and is not unlike the embryo of higher animals, while a space is formed between the trunk of the little mass and the membrane of the egg. The next stage would seem to be the rupture of the egg-membrane and the expulsion of the embryo, but this process I have not observed in operation, although I have seen on the one hand embryos which appeared to be just released from their investing membrane, while on the other I have detected egg-membranes evidently cast off by ecdysis. In some few of the ova I have observed adipose cells, some large and some small, mingled with the germinal cells.

It is a curious fact, that in the development of the *Entozoon folliculorum*, a remarkable embryonic form is met with which is peculiar to the long variety of the animal, and is not met with in the shorter kind. This embryonic body is elongated, rounded and bulky at one extremity; smaller, somewhat tapering and blunt-pointed at the other, and enlarged towards the middle by the development from one of its sides of two oval-shaped prominences which subside gradually into the larger end and join the smaller end, either at a right or at a receding angle. This peculiarity of form enables us to divide the embryo into a body, which comprises the larger end and these two oval prominences, and a tail, which is the smaller and shorter end; the principal changes in its form taking place, in the course of development, being the elongation of the tail and the enlargement or subsidence of the oval prominences. The dimensions of the embryo are $\frac{1}{313}$ to $\frac{1}{317}$ of an inch in the long, and $\frac{1}{714}$ to $\frac{1}{585}$ in the short diameter. In structure the embryo presents a close analogy with the ovum, being composed of nucleated cells, having the same disposition and appearance, and enclosing in the centre of their mass a number of larger cells. The larger cells correspond in position with the broadest part of the embryo, and extend more or less in proportion to its development into the cephalic and caudal portions. They also vary in their size, the central cells being the largest, while those which surround them are small and more numerous.

The smallest of the ova that I have examined are something less in length than

twice their breadth, but, as they progressively enlarge, they undergo a corresponding alteration in their form; they become elongated, they swell towards the centre, and one end acquires a slight predominance in bulk over the other. This change in the form of the ovum converts it into an embryo; in one position the embryo is still oval, the one extremity being somewhat larger than the other, but as soon as it rolls over on its side the prominence of the middle part is perceptible. At this period the tail is shorter than the bulky part, and the latter scarcely presents any trace of division into the two lobe-like protrusions that are subsequently formed. As the embryo progresses in size the lobes become more apparent, and, seen from the front, the entire body is not unlike an ace of clubs with an elongated stalk. The next advance in growth is indicated by a further increase in length of the tail portion, and a more equable enlargement of the rest, so that the subdivision of the convex mass, although still apparent, is less manifest than it had been previously.

The form of embryo just described was that of the specimen which measured $\frac{1}{317}$ of an inch in length. Lying near to this in the same mass of sebaceous substance was another, a very little longer, being only $\frac{1}{300}$ of an inch in length, but different in proportions. It was divisible into a head, a thorax, and a tail-like abdomen. The head was a rounded portion of the mass, distinguished from the rest by a slight constriction, but presenting no distinction of parts. The thorax was oval in shape, largest in the middle, and diminishing towards the ends; and the abdomen was cylindrical, much less in diameter than the thorax, and uniform in size. The animal appeared to be composed internally of an assemblage of cells enclosed in a thin membrane. The cells were all of the same size, or differed but little in this respect, and there was no trace of markings upon any part of the tegumentary covering. There was one character however in this specimen which distinguishes it at once from the embryonic form, and which has induced me to regard it as the first stage of development of the young animal. This character is the presence of three pairs of legs, which are extremely short, and look like conical prolongations of the substance of the animal. In a more advanced stage the divisions of the body become more distinctly defined, and begin to assume the characters by which they are approximated to the perfect animal. The head, for instance, is seen to be composed of two oval-shaped lobes, and a conical central piece, projected at the extremity of the body; the thorax still retains its oval form, but is broader behind than in front, and the abdomen tapers gradually backwards to a rounded point. Other indications of the immature state in more advanced stages are,—the absence of cephalic palpi; the shortness and straitness of the thorax; the absence or small size of the phalanges; the great length of the cylindriform and tapering abdomen; the slightness of the thoracic and abdominal markings; and the confused and cellular structure of the interior. I have found the length of the young animal while possessing only three pairs of legs, to range between $\frac{1}{300}$ and $\frac{1}{50}$ of an inch, while in breadth its measurements were from $\frac{1}{833}$ to $\frac{1}{300}$. After the attainment of four pairs of legs, its length ranged between

$\frac{1}{75}$ and $\frac{1}{50}$ of an inch, and its breadth between $\frac{1}{625}$ and $\frac{1}{555}$; one remarkably long specimen measured $\frac{1}{48}$.

The development of the short variety of the Entozoon is unattended by an intermediate embryonic form. The elements of the head and the feet are produced from the ovum itself, and with very little alteration in the form of the latter. I have already remarked that the largest of the ova become elongated, and if we suppose that the head is produced from one extremity, while three pairs of legs are projected at the sides, we shall have the young form of the animal. The smallest specimen which I have examined was somewhat exceeded in length by the largest of the ova, measuring only $\frac{1}{333}$, while the ovum measured $\frac{1}{330}$ of an inch. And I found a gradual progression in length from that specimen upwards to the more perfect kinds. This early form, like the analogous one of the long variety, possesses only three pairs of legs, which resemble mere protrusions of the external membrane. The head is equally imperfect in form, and the abdominal striæ are not apparent; the internal structure again is a mere assemblage of cells; the changes which ensue during the progressive improvement of this form are,—an elongation of the abdomen, the formation of abdominal rings, and of the thoracic markings. There is one peculiarity which is more remarkable in the young of the short variety than in that of the larger kind, and that is, the very frequent ecdysis. The three-legged form of the short variety measures in long diameter from $\frac{1}{333}$ to $\frac{1}{167}$, and in breadth from $\frac{1}{1111}$ to $\frac{1}{555}$ of an inch.

Like the long variety, the young of the shorter kind has a four-legged as well as a three-legged stadium, the production of an additional pair of legs becoming apparent after the throwing off one of the exuviæ. During this stage the animal begins to assume the general form of the perfect state; the thorax loses its straitened character and becomes rounded and larger; the abdomen becomes longer, and instead of tapering gradually towards the tail, maintains its bulk until near the extremity, when it becomes suddenly smaller, and forms an elongated point. Moreover, during this period the head is more fully formed; the segments of the thorax and legs are more completely developed, and the abdominal rings more distinct. The internal structure is also modified and improved. The measurements of the four-legged stage of the young of the short variety range in length between $\frac{1}{300}$ and $\frac{1}{135}$, and in breadth between $\frac{1}{625}$ and $\frac{1}{555}$ of an inch.

On reviewing the structure of this remarkable animal, I feel again disposed to revert to the position which it should occupy in the animal kingdom; that it is not a member of the class *Insecta* seems proved by its possession of four pairs of legs; that it is not an *Acarus* must be manifest from the preceding description; and that it is not an *Arachnidan* appears to be equally certain. The distinct separation between the head and thorax, the incomplete separation of the latter from the abdomen, the annulate structure of the abdomen, the free movements of the latter, and especially its capability of contraction, both in the longitudinal and transverse direction, are

arguments for regarding it as an *Annelidan*. While, on the other hand, Mr. GRAY of the British Museum, to whom I submitted the animal, considers it to be allied to the *Entomostracous Crustacea*, to that group of animals intermediate between worms and insects, of which DE BLAINVILLE speaks in the following terms:—"Genre d'animaux tellement bizarres au premier aspect, que les zoologistes sont encore fort peu d'accord sur la place qu'ils doivent assigner à ce groupe dans la série animale"*.

Note.—The foregoing paper was first communicated to the Royal Society in December 1842 and was read in March 1843; previously to being again communicated it was remodelled, the facts remaining the same.—E. W.

EXPLANATION OF THE PLATES.

PLATE XV.

The whole of the figures, with a few exceptions stated in the references, are drawn to a scale of one line to the $\frac{1}{1500}$ of an inch.

Fig. 1. A dorsal view of the long variety; showing tegumentary and internal texture. This animal measured $\frac{1}{63}$ of an inch in length.

Fig. 2. A side view of the same.

Fig. 3. A ventral view of the same animal; the mouth is well shown.

Fig. 4. The short variety; a dorsal view, the head retracted, and seen through the transparent integument of the thorax. The specimen measured $\frac{1}{130}$ of an inch in length.

Fig. 5. The same animal; seen upon its ventral surface.

It will be remarked that these figures are not extremes of measurement; but the difference between them is nevertheless very striking. In addition to relative length of abdomen, the caudal extremity forms a conspicuous character.

Fig. 6. A group of animals found in the sebaceous substance of a living person. This and the two following figures are not drawn to a scale.

Fig. 7. A similar group, situated within a hair-follicle.

Fig. 8. This figure represents a hair-follicle, with two sebaceous glands opening into it. An *Entozoon folliculorum* is seen between the cylinder of the hair and the follicle. It must be remembered that the hair is one of the minute downy hairs of the skin.

Fig. 9. The head, viewed upon its under surface.

a. One of the cephalic palpi, curved downwards; its prismoid truncated extremity is seen, as also the phalanges.

b. A spine or tubercle on its penultimate segment.

c. The reniform body. *d*. The antennæ-like palpi.

e. The four labral palpi.

* Dictionnaire des Sciences Naturelles. Article *Lernée*.

f. The three labial palpi. The row of organs within the palpi are the maxillæ which border the mouth and pharynx.

g. Parts entering into the structure of the pharynx.

h. The boundary lines of the collar.

i, *i*. The first pair of thoracic plates.

k, *k*. The first segments of the anterior pair of legs.

Fig. 10. The head, viewed upon its superior surface.

The letters of reference to *k* are the same as in the preceding figure.

l. The flask-shaped cephalic organ; at the apex of this organ the convexities of the labeal palpi are seen.

m. The eyeball, surrounded by its orbit. *n*. The thoracic carapax.

o. The pointed termination of the flask-shaped organ.

p, *p*. The oval bodies between which it is received, and to which part of the retractor muscle of the head is attached.

PLATE XVI.

Fig. 11. A small mass of ovum-corpuscles? These corpuscles measured $\frac{1}{3500}$ of an inch; they are not drawn to a scale.

Fig. 12. Ovum-corpuscles increased in growth and containing numerous cells. This figure, like the preceding, is not drawn to a scale.

Fig. 13. Three ova, showing progressive growth. The measurements of these ova were $\frac{1}{1350}$, $\frac{1}{833}$ and $\frac{1}{770}$ of an inch.

Fig. 14. An ovum measuring $\frac{1}{500}$ of an inch in length.

Fig. 15. An ovum measuring $\frac{1}{470}$ of an inch.

Figs. 16, 17. Ova measuring $\frac{1}{417}$ of an inch in length.

Fig. 18. An ovum elongated in figure, and measuring $\frac{1}{330}$ of an inch.

Fig. 19. An ovum which has assumed the form of the next stage of development of the Entozoon.

The whole of the ova here represented exhibit structural modifications, having reference to development. This is particularly evident in figs. 16 and 17.

Fig. 20. Embryonic form of the long variety of the Entozoon; fig. 19 exhibits a transition to this form. The figure measured $\frac{1}{313}$ of an inch in length.

Fig. 21. An embryonic form, in a different position to the preceding. The specimen measured $\frac{1}{304}$ of an inch in length.

Fig. 22. An embryonic form in a different view. Length $\frac{1}{338}$ of an inch.

Fig. 23. The largest embryo I have observed. It measured $\frac{1}{217}$ in length.

Fig. 24. An embryo upon the sides of which three pairs of legs are in progress of development. This is the first gradation in the six-legged stage of the long variety. The specimen measured $\frac{1}{300}$ of an inch in length.

Fig. 25. An animal more advanced in growth, and enclosed in exuviæ. This speci-

men is remarkable for the abundance of cells contained in its interior; it measured $\frac{1}{96}$ of an inch in length.

Fig. 26. A more advanced stage of growth, rudiments of a fourth pair of legs being perceptible. The animal measured $\frac{1}{88}$ of an inch in length.

Fig. 27. The most advanced gradation of the six-legged young. The head is yet very imperfect, as are the fourth pair of legs. This specimen measured $\frac{1}{63}$ of an inch in length.

Figs. 28, 29. Forms which the young animal assumes when it contracts its thorax and withdraws its head. Fig. 28 is the animal represented in figure 26.

Fig. 30. A young animal with four pairs of legs casting its exuviæ. This specimen measured $\frac{1}{83}$ of an inch in length.

Fig. 31. The ordinary form of the four-legged young of the long variety. The specimen measured $\frac{1}{64}$ of an inch in length.

Fig. 32. The same animal turned a little to one side.

PLATE XVII.

Fig. 33. An animal approaching maturity. Its perfection is indicated by the figure and segmented structure of the thorax. It still, however, retains the long, taper and cylindrical abdomen of the imperfect forms. This specimen measured $\frac{1}{50}$ of an inch in length.

Fig. 34. A mature form, somewhat contracted in length and unusually full of nucleated granules. The specimen measured $\frac{1}{86}$ of an inch in length.

a. The anal aperture.

Fig. 35. The smallest young animal of the short variety I have yet examined; it resembled an ovum from which legs were in progress of development. It measured only $\frac{1}{133}$ of an inch in length.

Fig. 36. More advanced form; the lines indicating abdominal segments were apparent on this specimen. It measured in length $\frac{1}{350}$ of an inch.

Fig. 37. An animal undergoing the exuviating change. Its cellular structure is shown. It measured $\frac{1}{355}$ of an inch in length.

Fig. 38. A more advanced stage; the absence of phalanges in all the figures is a prominent feature. They are all cellular in structure. This specimen measured $\frac{1}{167}$ of an inch in length.

Fig. 39. The young state of the perfect animal of the short variety. This specimen is enclosed in its exuviæ; it measured $\frac{1}{140}$ of an inch in length.

Fig. 40. The young state of the perfect animal; the abdomen is perfect, but the legs are rounded and without phalanges. This specimen measured $\frac{1}{110}$ of an inch in length.

Fig. 41. A portrait of the texture of a young specimen of the present form. It is not drawn to the scale.

Fig. 42. A perfect form of the short variety. The animal is turned a little upon its side; it measured $\frac{1}{110}$ of an inch in length.

XII. *Observations on some of the Nebulæ.* *By the Earl of* Rosse, *F.R.S.*, &c.

Received June 10,—Read June 13, 1844.

As every addition, however trifling, to the little we know with certainty respecting the nebulæ can scarcely be considered wholly uninteresting, I have ventured to communicate a few observations made with the speculum of three feet aperture described in the Philosophical Transactions for 1840.

In using that instrument, the object was rather to test its powers, and to decide the merits of progressive experiments, than to seek for astronomical results, and therefore the micrometer was not employed; in every case, however, the sketches were repeatedly compared with the originals, and having usually the advantage of the opinion of one or more friends, and always of that of my assistant, I believe they will be found to be tolerably correct. Without accurate micrometrical measurements any sketch can be of comparatively little value as an astronomical record, since it would be scarcely safe under any circumstances to consider it as decisive evidence, where the question was whether any change had or had not taken place in the general outline or internal structure of a nebula, or in the relative positions of the remarkable stars in or near it. Still measurements to be valuable must be exact; and it would perhaps have been misspent time to have employed the micrometer with an instrument not well suited to the purpose, when there was a prospect of being under the necessity of repeating the same operations again, probably at a very short interval, in making a complete examination of the nebulæ with the instruments now in progress.

From these trifling sketches, however, we may perhaps faintly see some indications of the course which our speculations on the physical structure of the nebulæ are likely to take under the guidance of increasing information. Some estimate may also perhaps be made of the amount of knowledge to be gained by an examination of all the known nebulæ with instruments like the present telescope, which astronomers favourably circumstanced may construct without any very serious difficulty.

The actual time in one year during which a powerful telescope can be used effectively is so short, that where observations must be accompanied by sketches, the progress is necessarily slow; and it is still more so when the micrometrical measurement of faint objects becomes an essential portion of the work. Out of a considerable number of tolerably good working nights there are very few, and even then often but for a short time, when high magnifying powers can be employed; so that upon the whole a great deal cannot be accomplished by one instrument in a limited period. As to the present telescope, it has not been constantly employed. Unless the beginning of the night was favourable nothing was ever done; a regular system

of observing would have been quite incompatible with the constant care and attention required in the progress of the more important work, the construction of a telescope of greater power, so that much fewer objects have been examined than would otherwise have been practicable; and even with the great facilities afforded by Sir JOHN HERSCHEL's invaluable catalogue, the whole amount of work done has been no more than the examination of about two-thirds of the figured nebulæ, and a few others in the general catalogue, many of them, or rather, perhaps, most of them, under circumstances but moderately favourable.

The sketches were originally made in the gallery of the telescope, and represent the objects placed as they appeared, not as they actually exist in space. I have copied them without alteration, not thinking that anything would be gained by placing them approximately in their true positions, while they would perhaps be less convenient for future re-examination and correction. The references are to Sir JOHN HERSCHEL's Catalogue.

Plate XVIII. fig. 88 is one of the many well-known clusters; I have selected it merely for the purpose of showing that in such objects we find no new feature, nothing which had not been seen with instruments of inferior power; the stars, of course, are more brilliant, more separated, and more numerous. I fear that no amount of optical power will make these objects better known to us, though perhaps exact measurements may bring out something.

Fig. 81 is also a cluster; we perceive in this, however, a considerable change of appearance; it is no longer an oval resolvable Nebula; we see resolvable filaments singularly disposed, springing principally from its southern extremity, and not, as is usual in clusters, irregularly in all directions. Probably greater power would bring out other filaments, and it would then assume the ordinary form of a cluster. It is studded with stars, mixed however with a nebulosity probably consisting of stars too minute to be recognized. It is an easy object, and I have shown it to many, and all have been at once struck with its remarkable aspect. Everything in the sketch can be seen under moderately favourable circumstances.

Plate XIX. fig. 26, on the contrary, is a difficult object; it requires an extremely fine night and a tolerably high power; it is then seen to consist of innumerable stars, mixed with nebulosity; and when we turn the eye from the telescope to the Milky Way, the similarity is so striking that it is impossible not to feel a pretty strong conviction that the nebulosity in both proceeds from the same cause.

Fig. 29.—The annular nebula in Lyra; 2 is the star in Sir JOHN HERSCHEL's sketch; I have inserted the six other stars as in some degree tests of the power of a telescope. Near star 3 there are two very minute stars seen with great difficulty; the others are easily seen whenever the night is sufficiently good to show the nebula well. The filaments proceeding from the edge become more conspicuous under increasing magnifying power within certain limits, which is strikingly characteristic of a cluster; still I do not feel confident that it is resolvable. I am however disposed to

think that it was never examined when the instrument was in as good order, and the night as favourable, as on the several occasions when the resolvable character of fig. 26 was ascertained.

Fig. 47 is one apparently of another class. It has a star in the centre, and is of unequal brightness; the nebulosity is in patches, and I have sometimes fancied, though probably erroneously, that I could discover in it a faint resemblance to fig. 26. The star in the centre is easily seen, and there is nothing peculiar in its appearance; it is exactly like other stars seen in nebulæ; still it may really be but the brilliant condensed centre of a very remote cluster. I have not, however, detected any gradual increase of brilliancy towards the centre.

Not to multiply sketches which soon may require correction, I shall merely add that in fig. 32 we also find a star in the centre, and in fig. 85 likewise a star in the centre, and many other minute stars in and close to it, so that it is really a cluster. The double nebula (fig. 72) consists of two clusters, between which there is a star easily seen on even an indifferent night. In fig. 49 there are minute stars between and about the three large stars, and I think there can be no doubt it is a cluster. Fig. 25 abounds in stars mixed with nebulosity; I have not seen it on a very fine night, but it was observed by my assistant, and by a gentleman who was with him, and they had no doubt but that the centre was completely resolved. In the little annular nebula, fig. 48, I see nothing remarkable, farther than a star in the north preceding edge; it is tolerably conspicuous, and is about half-way between the exterior and interior circumference of the annulus.

Fig. 45 is a very remarkable object. It is no longer a planetary nebula, but an annular nebula, like that of Lyra, with a similarly fringed edge, though much less distinctly seen: it is oval, but the central portion is not so dark as that of Lyra; it very closely resembles the annular nebula of Lyra seen with an instrument of inferior power.

In several of the other figured nebulæ something has been discovered as to matters of detail. In some we have found perhaps a few minute and apparently accidental stars, in others a larger extent of nebulosity, and consequently a different form of outline, but nothing of sufficient importance to make it desirable further to prolong this paper. It appears to me, however, to be an important fact, that all we have seen strongly confirms the accuracy of Sir John Herschel's judgement in selecting the nebulæ which he places in the class designated as resolvable. It is important from its bearing on future researches; for where the power of our instruments is insufficient to do more than to bring to light distinctly the peculiar characteristics of resolvability, these once observed with due caution and their reality ascertained beyond doubt, we shall conclude with little danger of error, that the object is really a cluster. We should err, however, were we to assume the converse of the proposition, that the absence of all symptoms of resolvability was evidence conclusive that the object was not a cluster. In some instances, with increasing optical power, the resolvable

character has become clearly developed, as in fig. 26, and a further increase of power has shown the object resolved.

It is also perhaps important to observe, that now, as has always been the case, an increase of instrumental power has added to the number of the clusters at the expense of the nebulæ, properly so called; still it would be very unsafe to conclude that such will always be the case, and thence to draw the obvious inference that all nebulosity is but the glare of stars too remote to be separated by the utmost power of our instruments.

The magnifying powers I have usually employed vary from 250 to 800; occasionally much higher powers have been useful; but to see every thing described in this paper, a power of 600 with perfect definition is sufficient.

In my paper on the Reflecting Telescope, in the Philosophical Transactions for 1840, there is an error which I am anxious to take this opportunity of correcting. In page 523, line 14, instead of "to the polisher," it should have been "to the bar which moves the polisher measured on the edge F of the tank." We have always estimated the effect of the excentric G by the space on the edge of the tank traversed by the bar: the number 2·7 was entered down at once from the journal-book, whereas, to have suited it to the form of expression made use of, it should have been reduced to the centre of the polisher.

INDEX

TO THE

PHILOSOPHICAL TRANSACTIONS

FOR THE YEAR 1844.

A.

Analysis, on a general method in, 225. A. Preliminary theorems, 228. B. § 1. Theory of linear differential equations, 232. B. § 2. On the solution of linear differential equations by series, 234. B. § 3. On the solution of linear partial differential equations by series, 240. C. § 1. On the integration of linear differential equations in finite terms, 244. C. § 2. Some illustrations of a more general method of resolution, 257. D. § 1. Theory of series and of generating functions, 261. D. § 2. On the theory of generating functions as connected with equations of differences, 266. D. § 3. On the theory of generating functions as connected with equations of partial differences, 268. E. Application of the theory of series to the evaluation of certain definite integrals, 270. F. § 1. Theory of equations of finite differences, 276. F. § 2. On the solution of equations of finite differences in series, 277. F. § 3. On the solution of equations of differences in finite terms, 279. Postscript, 282.

Andrews (Thomas, M.D.). On the thermal changes accompanying basic substitutions, 21.

Animal heat, miscellaneous observations on, 57. I. On the temperature of the Pelamides, *ibid.* II. On the temperature of Man in advanced age, 59. III. On the effect of air of different temperatures on animal heat, 61. IV. On the effect of exercise on the temperature of the body, 62.

B.

Bakerian Lecture, 65.

Belemnites, a description of certain, preserved, with a great proportion of their soft parts, in the Oxford clay, at Christian-Malford, Wilts, 65.

Boole (George, Esq.). On a general method in analysis, 225.

D.

Daniell (J. Frederic, Esq., D.C.L.). Additional researches on the electrolysis of secondary compounds, 1.

Davy (John, M.D.). Miscellaneous observations on animal heat, 57.

Differences, equations of, on the theory of generating functions as connected with, 266.

——— *equations of partial*, on the theory of generating functions as connected with, 268.

——— *finite*, theory of equations of, 276.

———, on the solution of equations of, in series, 277.

———, on the solution of equations of, in finite terms, 279.

Differential equations, linear, theory of, 232.
———————————, on the solution of, by series, 234.
———————————, on the solution of partial, by series, 240.
———————————, on the integration of, in finite terms, 244.
———————————, illustrations of a general method of resolution, 257.

E.

Electrical and chemical actions which take place before and after completion of the voltaic circuit, an account of some experiments to test the relation of the, 39.
Electrolysis of secondary compounds, additional researches on, 1.
Entozoon folliculorum, a newly discovered parasitic animalcule of the human skin, researches into the structure and development of, 305.

F.

Fownes (George, Esq.). On the existence of phosphoric acid in rocks of igneous origin, 53.
Functions, generating, theory of, 261.
———————————, as connected with equations of differences, 266.
——————————————————— of partial differences, 268.

G.

Gassiot (John P., Esq.). A description of an extensive series of the Water Battery; with an account of some experiments made in order to test the relation of the electrical and chemical actions which take place before and after the completion of the voltaic circuit, 39.

H.

Heat, Animal, miscellaneous observations on, 57. I. On the temperature of the Pelamides, *ibid.* II. On the temperature of Man in advanced age, 59. III. On the effect of air of different temperatures on animal heat, 61. IV. On the effect of exercise on the temperature of the body, 62.

I.

Integrals, Definite, application of the theory of series to the evaluation of certain, 270.
Insecta, on the reproduction of lost parts in, 288.

M.

Magnetism, Terrestrial, contributions to. No. VI. Observations made on board Her Majesty's Ships Erebus and Terror, from June 1841 to August 1842, in the Antarctic Expedition under the command of Captain Sir James Clark Ross, R.N., F.R.S., 87. Deduction of the constants a and b in the corrections for the ship's attraction, 88. Deduction of the corrections, on account of the ship's attraction, for the observations of Inclination, 90. Index correction, 99. Observations of the Inclination, with needles whose poles were reversed, made at Garden Island, Sydney, 100; at the Bay of Islands, New Zealand, *ibid*; on the ice, 101; at

INSTITUTE LIBRARY

the Magnetic Observatory at Port Louis, in the Falkland Islands, *ibid.* Elements of calculation of the intensity observations, 107. General remarks, 116. Note by Mr. ARCHIBALD SMITH, 117*. General Table of the Declinations observed on board Her Majesty's Ships Erebus and Terror, between May 1841 and August 1842, 120. General Table of Inclinations, 122. General Table of the Intensity of the Magnetic Force, from the observations, 125. Declinations observed on board Her Majesty's Ship Erebus, between June 1841 and August 1842, 127; on board Her Majesty's Ship Terror, 141. Observations of the Inclination made on board Her Majesty's Ship Erebus, between April 1841 and August 1842, 151; on board Her Majesty's Ship Terror, 169. Observations of the Intensity of the Magnetic Force, made on board Her Majesty's Ship Erebus, between April 1841 and August 1842, 196; on board Her Majesty's Ship Terror, 204.

Man, on the temperature of, in advanced age, 59.

MILLER (W. A., Esq., M.D.). Additional researches on the electrolysis of secondary compounds, 1.

Myriapoda and Insecta, on the reproduction of lost parts in, 283. Myriapoda, 284. Insecta, 288.

N.

Nebulæ, observations on some of the, 321.

NEWPORT (GEORGE, Esq.). On the reproduction of lost parts in Myriapoda and Insecta, 283.

O.

OWEN (RICHARD, Esq.). A description of certain Belemnites, preserved, with a great proportion of their soft parts, in the Oxford clay, at Christian-Malford, Wilts, 65.

P.

Pelamides, on the temperature of the, 57.

Phosphoric acid, on the existence of, in rocks of igneous origin, 53.

R.

ROSS (Captain Sir JAMES CLARK, R.N.). Observations made on board Her Majesty's Ships Erebus and Terror, from June 1841 to August 1842, in the Antarctic Expedition under the command of, 87.

ROSSE (the Earl of). Observations on some of the Nebulæ, 321.

S.

SABINE (Lieut.-Colonel EDWARD, R.A.). Contributions to terrestrial magnetism, No. VI., 87.

Series, theory of, 261. Application of to the evaluation of certain definite integrals, 270.

SIMON (JOHN, Esq.). On the comparative anatomy of the thyroid gland, 295.

T.

Temperature of Man in advanced age, on the, 59.

———— *of the Pelamides*, on the, 57.

———— *of the Body*, on the effects of exercise on the, 62.

Thermal changes accompanying basic substitutions, on the, 21.
Thyroid Gland, on the comparative anatomy of the, 295. 1. Birds, *ibid.* 2. Reptiles, 296. 3. Fishes, 299.

W.

Water Battery, a description of an extensive series of the, 39.
Wilson (Erasmus). Researches into the structure and development of a newly discovered parasitic animalcule of the human skin—the *Entozoon folliculorum*, 305.

LONDON:
PRINTED BY RICHARD AND JOHN E. TAYLOR,
RED LION COURT, FLEET STREET.

PRESENTS

RECEIVED BY

THE ROYAL SOCIETY,

WITH THE

NAMES OF THE DONORS.

From June 1842 to November 1843.

PRESENTS.	DONORS.
ACADEMIES and SOCIETIES.	
Berlin :—	
Transactions of the Royal Academy of Sciences for 1840. 4to. *Berlin* 1842.	The Academy.
Proceedings of the Royal Academy of Sciences of Berlin, April 1842 to March 1843. 8vo. *Berlin* 1842.	———
Birmingham Philosophical Institution—the Report presented by the Committee of Managers to the Annual General Meeting, held Oct. 26, 1842, with the List of Patrons, Trustees and Members; the Meteorological Journal kept at the Institution, &c. 8vo. *Birmingham* 1842.	The Managers of the Institution.
Bologna :—Novi Commentarii Academiae Scientiarum Instituti Bononiensis. Tomus Quintus. 4to. *Bononiae* 1842.	The Institute.
Boston Society of Natural History :—Journal of Natural History, Vol. IV. No. 2. 8vo. *Boston* 1842.	The Society.
Brussels :	
Nouveaux Mémoires de l'Académie Royale des Sciences et Belles Lettres. Tome XV. 4to. *Bruxelles* 1842.	The Academy.
Bulletin des Séances. Tome IX. Nos. 3 à 9. 8vo. *Bruxelles* 1842.	The Academy.
Cambridge :—Transactions of the Philosophical Society. Vol. VII. Part 3. 4to. *Cambridge* 1842.	The Society.
Cornwall :—Polytechnic Society—Ninth Annual Report. 1841. 8vo. *Falmouth.*	The Society.
Dublin :—	
Royal Irish Academy Transactions. Vol. XIX. Part 2. 4to. *Dublin* 1843.	The Academy.
——— Proceedings. Vol. I. and Part 5. 8vo. *Dublin* 1841.	———
Edinburgh :—	
Royal Society Transactions, Vol. XV. Part 2. 4to. *Edinburgh* 1842.	The Society.
——— Proceedings, Nos. 19 and 20. 1841-42. 8vo. *Edinburgh.*	———
Glasgow :—Proceedings of the Philosophical Society. 4th Session, 1841-2. 8vo. *Glasgow* 1842.	The Society.
Haarlem :—	
Mémoires de la Société Hollandaise des Sciences. Tome II. 2me série. 4to. Haarlem 1842.	The Society.
Extrait du Programme de la Société Hollandaise des Sciences à Haarlem, pour l'année 1842. (2 copies.) Folio sheets.	———

Presents.	Donors.
ACADEMIES and SOCIETIES (*continued*).	
Lisbon :—	
Memoirs of the Royal Academy of Sciences, Vol. XII. Part 2. 4to. *Lisbon* 1839.	The Academy.
Discourse delivered on the 22nd January 1843, at the public meeting of the Academy of Sciences of Lisbon. By J. J. de Costa de Macedo. 4to. *Lisbon* 1843.	———
London : —	
Agricultural Society (Royal). Journal, Vol. III. Parts 2, 3. Vol. IV. Part 1. 8vo. *London* 1843.	The Society.
Astronomical Society. Memoirs, Vol. XII. XIII. and XIV. 4to. *London* 1842.	The Society.
——— Proceedings, Nos. 25 and 26. 8vo. *London* 1842.	———
Asiatic Society of Great Britain. Journal, No. 13. 8vo. *London* 1842.	The Society.
——— List of Members, Committees, &c. of. 8vo. *London* 1842.	———
British Association. Report of the Twelfth Meeting, held at Manchester in June 1842. 8vo. *London* 1843.	The Association.
——— Report of the Meeting held at Liverpool in September 1837, Vol. VI. 8vo. *London* 1838.	———
Civil Engineers, Minutes of Proceedings of, for the Session of 1842. 8vo. *London* 1842.	The Institution.
Electrical Society. Proceedings, Parts 5—8. 8vo. *London* 1842 and 1843.	The Society.
Entomological Society. Transactions, Vol. III. Parts 2 and 3. 8vo. *London* 1841–42.	The Society.
Geographical Society of London. Journal, Vol. III. and Vol. V. Part 1, 1833–35, Vol. XI. Part 2, 1841. Vol. XII. Parts 1 and 2. 8vo. *London* 1842.	The Society.
Geological Society. Transactions, Second Series, Vol. VI. Part 2. 4to. *London* 1842.	The Society.
——— Proceedings, Nos. 77 to 92, with Title and Index to Vol. III. as also a List of Members. 8vo. *London* 1842.	———
Linnæan Society. Transactions, Vol. XIX. Part 1. 4to. *London* 1842.	The Society.
——— Proceedings, Nos. 13 and 14. 8vo. *London* 1842.	———
Numismatic Society. Numismatic Chronicle and Journal, No. 20. Edited by John Yonge Ackerman, F.S.A. 8vo. *London* 1843.	The Society.
Royal Institute of British Architects of London. Transactions, Vol. I. Part 2. 4to. *London* 1842.	The Royal Institute.
Society of Arts. Transactions, Vol. LIII. Part 2. 8vo. *London* 1841.	The Society.
Statistical Society of London. Journal, Vol. V. Parts 2, 3. Vol. VI. Part 1. 8vo. *London* 1843.	The Society.
Zoological Society :—Transactions, Vol. III. Part 1.	The Society.
——— Proceedings, Part VIII. 1840. and Nos. 109 to 119.	———
——— Reports of the Council and Auditors, read at the Annual General Meeting, April 29, 1843, with a List of Members. 8vo. *London* 1843.	———
Lyons :—Société Royale d'Agriculture, etc. Annales des Sciences Physiques et Naturelles, d'Agriculture et d'Industrie. Tomes I., II. et III. royal 8vo. *Lyons* 1838–40.	The Society.

Presents.	Donors.
ACADEMIES and SOCIETIES (*continued*).	
Modena:—Memoirs of the Italian Society. Vol. XXII. Physical section. 4to. *Modena* 1841.	The Society.
Moscow:—	
Bulletin de la Société Impériale des Naturalistes de Moscou. Nos. 2, 3, 4, pour 1841, et 1 à 4, pour 1842. 8vo. *Moscou* 1841–2.	The Society.
Liste des Membres de la Société Impériale des Naturalistes de Moscou. 1842. 12mo. *Moscou* 1842.	———
Munich:—	
Transactions of the Royal Academy of Sciences. Philosophical class. Vol. III. Part 2. 4to. *München* 1841.	The Society.
Literary Notices of the same. Vols. XII., XIII., XIV. and XV. 4to. *München* 1841.	———
Naples:—Report of the Meetings and Labours of the Academy of Sciences. Nos. 1 and 2. 1842. 4to. *Naples* 1842.	The Academy.
Paris:—	
Académie Royale des Sciences. Comptes Rendus Hebdomadaires des Séances. Tome XIV. Nos. 22 à 26 et Tome XV. Nos. 1 à 8, 9 à 26. 2me Semestre. 1842. et 1 à 9. Tom. XVI. 4to. *Paris* 1842.	The Institute of France.
Institut Royal. Mémoires de l'Académie des Inscriptions et Belles Lettres. Tome XV. 4to. *Paris* 1842.	———
Mémoires, Morales et Politiques de l'Institut de France. Tome I. Savants Étrangers. 4to. *Paris* 1841.	The Institute.
Mémoires, Morales et Politiques de l'Institut de France. Tome III. 4to. *Paris* 1841.	———
Mémoires présentés par Divers Savants. Sciences Mathématiques et Physiques. Tome VII. 4to. *Paris* 1841.	———
Mémoires. Tome XVIII. 4to. *Paris* 1842.	———
Notices et Extraits des Manuscripts de la Bibliothèque du Roi et autres Bibliothèques, publiés par l'Institut Royale de France, faisant suite aux notices et extraits lus au Comité établi dans l'Académie des Inscriptions et Belles Lettres. Tome XIV. Part 2. 4to. *Paris* 1841.	———
Société de Géographie, Bulletin, 2me série. Tome XVI. 8vo. *Paris* 1841.	The Society.
Société Géologique, Bulletin; Table des matières et des auteurs pour le XIIme volume. 8vo. *Paris* 1840 à 1841.	The Society.
——— Tom. XIII., XIV. 8vo. *Paris* 1842 à 1843.	———
Société de Physique et d'Histoire Naturelle de Genève, Mémoires. Tome IXme. 4to. *Genève, Paris* 1842.	The Society.
Philadelphia:—	
American Philosophical Society Transactions. Vol. VIII. New series. Part 1. 4to. *Philadelphia* 1841.	The Society.
——— Proceedings, Nos. 20 to 23. 8vo. *Philadelphia* 1841–1842.	———
Siena:—Transactions of the Academy of Sciences. Vol. X. 4to. *Siena* 1841.	The Society.
Stockholm:—	
Transactions of the Royal Academy of Sciences of Sweden for 1840. 8vo. *Stockholm* 1842.	The Academy.
Report upon the State of Technology, by G. E. Pasch, for 1840. 8vo. *Stockholm* 1841.	———

Presents.	Donors.
ACADEMIES and SOCIETIES (*continued*).	
Report upon the State of Chemistry and Physic for 1840, by J. Berzelius. 2 vols. 8vo. *Stockholm* 1840.	The Academy.
Report upon the works published in Zoology between 1837 and 1840, by C. J. Sundewall. 8vo. *Stockholm* 1841.	———
Speech delivered before the Royal Academy of Sweden, by A. Anckarswärd, the 6th of April 1842. 8vo. *Stockholm* 1842.	The Author.
Washington :—Bulletin of the Proceedings of the National Institution for the Promotion of Science established at Washington in 1840. Vol. I. Nos. 1 and 2. 1842. 8vo. *Washington* 1841–1842.	The Institution. The Institution.
AIKINSON (JOS.) Results of further Experiments on Shape and Situation of Rain-Gauges. 8vo. *Harraby* 1843.	The Author.
AIRY (G. B.) On the Tides and Waves : from the Encyclopædia Metropolitana. 4to. *London*.	The Author.
AKERMAN (J. Y.) The Forgeries of Public Money, being the substance of a Lecture delivered before the Numismatic Society, April 23, 1843. 8vo. *London* 1843.	The Author.
ANONYMOUS :—	
Academy of Cimento, Florence. Essays and Experiments in Natural Philosophy, preceded by the history of the Academy. 4to. *Firenze* 1841.	His Imperial and Royal Highness the Grand Duke of Tuscany.
Annuaire pour l'an 1842, présenté au Roi par le Bureau des Longitudes. 2e édition augmentée de notices scientifiques : par M. Arago. 12mo. *Paris* 1842.	
A Transcript of a Treatise on Algorism or Arithmetic, from the unique MS. of the 15th century, preserved in the Public Library of the University of Cambridge. 4to. MS.	James O. Halliwell, Esq., F.R.S.
A Theory of the Structure of the Sidereal Heavens, including an explanation of the phenomena of the via lactea and nebulæ, founded on a new astronomical doctrine ; being a general explanation of the astral collocations upon geometrical principles, with plates of illustration. Part the First. 4to. *London* 1842.	The Author.
Archives du Muséum d'Histoire Naturelle, publiées par les Professeurs-Administrateurs de cet établissement : Tome I. 2me, 3me et 4me Livraisons ; Tome II. 1re, 2me et 3me Livraisons. Tome III. Livraisons 1, 2. 4to. *Paris* 1839–1841.	The Museum.
Bibliothèque de M le Baron Silvestre de Sacy. 8vo. *Paris* 1842.	Messrs. Dulau & Co.
Bulletin des Séances de la Société Vaudoise des Sciences Naturelles : No. 1 à 4. 8vo.	Prof. Wartmann.
Catalogue of the Fellows, Candidates and Licentiates of the Royal College of Physicians of London for 1842. 8vo. *London* 1842.	The College.
Catalogue of the Manuscript Music in the British Museum. 8vo. *London* 1842.	The Trustees.
Catalogue of the Library of the Royal Astronomical Society, February 1838. 8vo. *London* 1838.	The Society.
Catalogue des Livres, Dessins et Estampes de la Bibliothèque de feu M. S. B. Huzard, 3 Tomes. 8vo. *Paris* 1842.	M. L. Bouchard.
Catalogue de 514 Étoiles doubles et multiples découvertes sur l'hemisphère céleste boréal par la grande lunette de l'observatoire central de Poulkova, et Catalogue de 256 Étoiles doubles principales où la distance des composantes	The author.

Presents.	Donors.
ANONYMOUS (*continued*).	
est de 32 secondes à 2 minutes et qui se trouvent sur l'hémisphère boréal, par W. Struve. folio. *St. Pétersbourg* 1843.	
Chemical Experiments made in the Laboratory of the Utrecht High School. Parts 3 and 4. 8vo. *Rotterdam* 1842.	The Editors.
China, in a series of views displaying the scenery, architecture, social habits, &c. of this ancient and exclusive Empire, by Thomas Allom, Esq., with historical and descriptive notices by the Rev. G. N. Wright, M.A. Parts 1 to 8. 4to. *London*.	The Publishers.
Collection of Notices respecting the History and Geography of the Ultramarine Nations subjected to the Portuguese, Vol. VII. 4to. *Lisbon* 1841.	The Royal Academy of Sciences, Lisbon.
Connaissance des Temps ou des Mouvements Célestes, à l'usage des Astronomes et des Navigateurs pour 1843, 1844 et 1845; publiée par le Bureau des Longitudes. 8vo. *Paris* 1840–1842.	The Board of Longitude of Paris.
Conjectures sur l'Apparition insolite de la Comète de Mars 1843 et sur la Nature des Comètes en général; par M. le C. de M. 8vo. *Tours* 1843.	The Author.
Description of the Skeleton of an extinct gigantic Sloth, *Mylodon robustus*, with observations on the osteology, natural affinities, and probable habits of the Megatherioid quadrupeds in general. By Richard Owen, F.R.S., &c. published by direction of the Council of the Royal College of Surgeons. 4to. *London* 1842.	The Council of the Royal College of Surgeons.
Description of the Collection of Ancient Marbles in the British Museum, with Engravings. Part 9. 4to. *London* 1842.	The Trustees of the British Museum.
Distribution of Prizes in the City of Paris, on the subject of Peace; President the Marquis de la Rochfoucauld Liancourt. 8vo. *London* 1842.	Dr. John Lee, F.R.S.
Epitome of the MS. found at Herculaneum by Lorenzo Blanco, Studying Interpreter in the Royal Office of Papyri. 12mo. *Naples* 1841.	The Author.
Essai sur les Divisions Impaires de l'Angle par la Géométrie Plane.	Baron T. F. D. d'Attel Lutange.
—— sur la Duplication du Cube par la Géométrie Plane.	———
—— de Quadrature du Cercle par la Géométrie Plane.	———
Considérations sur la Solution des trois Problèmes précédents. 8vo.	———
Etat de l'Instruction primaire en Belgique. Rapport décennal présenté aux Chambres législatives, le 28 Janvier 1842. Par M. le ministre de l'intérieur. 8vo. *Bruxelles* 1842.	Professor Quetelet, Foreign Member R.S.
Examination Papers for the various degrees conferred by the University of London for the year 1842. 8vo. *London* 1842.	The University of London.
Explication de la Carte Géologique de la France, rédigée sous la direction de M. Brochant de Villiers inspecteur général des Mines: par MM. Dufrénoy et Elie de Beaumont. Tome I. avec une Carte. 4to. *Paris* 1841.	The Authors.
Eulogy of Count John Paradisi, written by the Associate and Secretary Antonio Lombardi. 4to. *Modena* 1841.	The Academy of Sciences, Modena
Fourth Annual Report of the Registrar-General of Births, Deaths and Marriages, in England. Presented to both Houses of Parliament by command of Her Majesty. (2 Copies.) Folio. *London* 1842.	The Registrar-General.
Investigation upon the Survey of the Coast of the United States, and the Construction of Standards of Weight and Measure, by a select Committee of Congress, in 1842: published by F. R. Hassler. 8vo. *Philadelphia* 1843.	The Publisher.
List of Additions to the Manuscripts in the British Museum in the years 1836–1840. 8vo. *London* 1843.	The Trustees of the British Museum.

Presents.	Donors.
ANONYMOUS (*continued*).	
List of Additions to the Natural History, Antiquities and Prints of the British Museum in the years 1836–1839. 8vo. *London* 1843.	The Trustees of the British Museum.
Lithographed Signatures of the Members of the British Association for the Advancement of Science, who met at Cambridge, June 1833, with a Report of the Proceedings at the public Meetings during the week; and an Alphabetical List of the Members. 4to. *Cambridge* 1833.	The Association.
MASON'S Hygrometer. A table for obtaining the Dew-point and Moisture by inspection, the degree of the dry bulb being at the head of the column, and that of the wet bulb at the side: opposite the latter will be found the dew-point and moisture: by William Bone, Esq. 8vo. *London* 1843.	The Author.
Mean results of the Thermometer, and the quantity of Rain for 1842, at Alford, about lat. 57° 13′ N., 420 feet above the level of the sea, and twenty-six miles inland from the sea at Aberdeen. Also, the number of fair days, and of days on which rain or snow fell, more or less: by the Rev. James Farquharson, M.A., F.R.S. A single slip. 12mo.	The Author.
Metropolis. Summary of the Weekly Tables of the Mortality, for 1842. Large folio sheet.	The Registrar-General.
Ordnance Survey. Astronomical Observations made with Ramoden's Zenith Sector, together with a Catalogue of the Stars which have been observed, and the amplitudes of the celestial arcs, deduced from the observations at the different stations: published by order of the Board of Ordnance. 4to. *London* 1842.	The Master General of the Ordnance, F.R.S.
Observations Météorologiques faites à Nijné-Taguilok et à Vicimo-Outkinsk (Monts Oural), Gouvernement de Perm, année 1841. 8vo. *Paris* 1842.	The "Dépôt de la Marine."
Reply to Accusations upon the Priority of certain Discoveries by Sig. Professor Majocchi, addressed to Prof. Zantedeschi. 4to. *Vicenza* 1843.	The Author.
Report of a Committee of the British Association for the Advancement of Science, on the Vital Statistics of Large Towns in Scotland (from the Report of the British Association for 1842). 8vo. *London* 1843.	Lieut.-Col. W. H. Sykes, F.R.S.
Report on the Geology of the County of Londonderry and of parts of Tyrone and Fermanagh, examined and described under the authority of the Master General and Board of Ordnance, by J. E. Portlock, F.R.S., Captain R.E. 8vo. *Dublin and London* 1843.	The Master General of the Ordnance.
Rules and Regulations for the Government of the Athenæum, for 1842. 12mo. *London* 1842.	The Committee.
Select Papyri in the Hieratic Character, from the Collections of the British Museum. fol. *London* 1842.	The Trustees of the British Museum.
Six Lectures on Arithmetic; containing a Familiar Explanation of the Principles and Rationale of the General Rules of Arithmetic: designed for the Use of Normal Schools, &c.; by the Author of the New Introduction to the Mathematics, &c. 12mo. *London* 1842.	The Author.
Some Remarks from the Editorial Columns of the Lancet of October 15, 1842, relating to an article by T. Wharton Jones, F.R.S., on the Corpuscles of the Blood. 8vo. *London* 1842.	Dr. Martin Barry, F.R.S.
Sur les Travaux récents qui ont eu pour objet l'Étude de la Vitesse de Propagation de l'Électricité. 8vo. *Genève*.	Prof. Wartmann.
The Certainty of the Origin of Evil in the World. By a Layman. 8vo. *London* 1842.	The Rt. Hon. Sir Edward Hyde East, Bart., F.R.S.

Presents.	Donors.
ANONYMOUS (*continued*).	
Twenty-ninth Annual Report of the Council of the Royal Geological Society of Cornwall, with the President's Address, and Papers and Notices read to the Society. 8vo. *Penzance* 1842.	Sir Charles Lemon, Bart., F.R.S.
The Nautical Almanac and Astronomical Ephemeris, for 1846: published by Order of the Lords Commissioners of the Admiralty. 8vo. *London* 1842.	Lieut. Stratford, F.R.S.
Voyages de la Commission Scientifique du Nord pendant les années 1835, 1836, 1838, 1839 et 1840: publiés par Ordre du Roi sous la Direction de M. Paul Gaimard, Président de la Commission. 8vo. *Paris*.	The Publishers.
ARGELANDER (F. W. A.) Academical Dissertation upon the Fidelity of Bayer's Uranometria. 4to. *Bonn* 1842.	The Author.
ART, WORKS OF.	
An engraved portrait of Sir Isaac Newton from a painting by Vanderbank in the year 1726, which painting was lately presented to the Royal Society by Charles Vignolles, Esq.	Mr. John D. Roberton, Assist. Sec. R.S.
A proof impression of the New London Bridge, engraved from the original drawing presented to the Institution of Civil Engineers, by B. Albano. *Large sheet.*	B. Albano, Esq.
Impression taken under the superintendence of Messrs. Mitchell, Heaton and Mitchell, Printers, Duke Street, Liverpool, at the identical Press at which Dr. Franklin worked in London as a Journeyman in the years 1725–1726 (in a frame). The Twelve Rules laid down by Benjamin Franklin, in his youth for his self-government.	W. Vaughan, Esq., F.R.S.
Specimen de l'Imprimerie de Bachelier, Rue du Jardinet, 12. 4to. *Paris* 1842.	The Publisher.
ATKINSON (Jos.) A Tabular View of the yearly Quantity of Rain which falls in the different parts of Great Britain. folio sheet.	The Author.
BACHMAN (Rev. Jno.) Description of a New Species of Quadrupeds inhabiting North America, by J. J. Audubon, Esq., and the Rev. John Bachman, D.D. 8vo.	The Authors.
BAILY (Sam.) A Letter to a Philosopher in reply to some recent attempts to vindicate Berkeley's Theory of Vision, and in further elucidation of its unsoundness. 8vo. *London* 1843.	The Author.
BATEMAN (Jas.) The Orchidaceæ of Mexico and Guatemala. folio. *Lond.*	The Author.
BEAMISH (N. L.) Address delivered to the Cork Scientific and Literary Society, at the opening of the Session, October 6, 1842. 8vo. *Cheltenham.*	The Author.
BENNETT (J. H.) On the Parasitic Fungi found growing in Living Animals. 4to. *Edinburgh* 1842.	The Author.
BERNARD (C. A.) Les Bains de Brousse, en Bithynie (Turquie d'Asie), avec une vue des bains et un des environs de Brousse. 8vo. *Constantinople* 1842.	The Author.
BESSEL (F. W.) Astronomical Investigations, Part 2. 4to. *Königsberg* 1842.	The Author.
BINET (M. J.) Mémoire sur la Variation des Constantes Arbitraires dans les Formules Générales de la Dynamique et dans un Système d'Équations analogues plus étendues. 4to. *Paris* 1841.	The Author.
——— Mémoires sur les Intégrales définis Eulériennes; et sur leur application à la théorie des suites, ainsi l'évaluation des fonctions de grands nombres. 4to. *Paris* 1840.	———
BLANCO (L.) Sennografia of the Papyri of Herculaneum. 8vo. *Naples* 1842.	The Author.
——— Determination of some Archæological Questions. 8vo. *Naples* 1842.	———

Presents.	Donors.
BOLZANO (B.) Essay upon an objective fundamental Doctrine of the Combination of Powers. 4to. *Prag.* 1842.	The Author.
BONAPARTE (Charles Luciano Principe.) Observations upon the State of Zoology, as far as regards vertebrated animals, during the years 1840 and 1841. 8vo. *Firenze* 1842.	The Author.
BÖTTICHER (C.) School of Ornamental Design, a course of study for drawing and designing ornaments. Oblong folio. *Berlin* 1838.	The Author.
BROWN (Thos.) The Reminiscences of an Old Traveller throughout different parts of Europe, including historical details of the Russian Empire, and anecdotes of the Court. 8vo. *Edinburgh* 1843.	The Author.
BUQUOY (G. G. von.) Prodromus of a new and improved mode of stating the higher Analytical Dynamics, Part 1. 4to. *Prag.* 1842.	The Author.
BURGE (Wm.) The Temple Church; an account of its restoration and repairs. 8vo. *London* 1843.	The Author.
BURGGRAVE (A.) Études sur André Vésale, précédées d'une notice historique sur sa vie et ses écrits; ouvrage publié sous le patronage des médecines Belges. 8vo. *Gand* 1841.	The Author.
CANTON (T.) General Features of Chusan, with remarks on the Flora and Fauna of that island. 8vo. *London* 1842.	The Author.
CASTELNAU (F. de.) Vues et Souvenirs de l'Amérique du Nord, livraison 1—3. 4to. *Paris* 1842.	The Author.
CAUCHY (A.) Exercices d'Analyse et de Physique Mathématique, livraisons 13—18 de Tome II. 1841. 4to. *Paris* 1841.	The Author.
CERQUERO (José Sanchez.) The Nautical and Astronomical Ephemeris, made at the Observatory of St. Fernando, for the years 1840, 1841, 1842, 1843 and 1844. 4to. *Madrid* 1837–1841.	The Author.
CHASLES (M.) Histoire de l'Algèbre.—I. Sur l'époque où l'Algèbre a été introduite en Europe.—II. Sur les expressions Res et Census, et sur le nom de la science, Algebra et Almuchabala. 4to. *Paris* 1841.	The Author.
——— Note sur la Nature des Opérations Algébriques (dont la connaissance a été attribuée, à tort, à Fibonacci). 4to. *Paris* 1841.	———
CHATELAIN (Le Chevalier.) Les Glorieuses, ou deux Fêtes et deux Victoires. 8vo. *London* 1843.	The Author.
——— La Bienfaisance, Poëme. 8vo. *London* 1843.	———
CLARK (Sir James.) Remarks on Medical Reform; in a second letter addressed to the Right Hon. Sir James Graham, Bart. 8vo. *London* 1843.	The Author.
CLAY (Chas.) Cases of Peritoneal Section, for the Extirpation of Diseased Ovaria by the large Incision from Sternum to Pubes, successfully treated. 4to. *London* 1842.	The Author.
CRICHTON (Sir Alexander.) Commentaries on some doctrines of a dangerous tendency in Medicine, and on the general principles of safe practice. 8vo. *London* 1842.	The Author.
CREUZE (A.) Papers on Naval Architecture, and other subjects connected with Naval Science: conducted by Wm. Morgan and Augustin Creuze. 3 vols. and No. 13. 8vo. *London* 1829–1832.	Augustin Creuze, Esq., F.R.S.
DANIELL (J. F.) An Introduction to the study of Chemical Philosophy; being a preparatory view of the forces which concur to the production of Chemical Phænomena (second edition). 8vo. *London* 1843.	The Author.
DAUBENY (Chas.) Sketch of the Writings and Philosophical Character of	The Author.

Presents.	Donors.
Augustin Pyramus de Candolle, Professor of Natural History at the Academy of Geneva. 8vo. *Edinburgh* 1843.	
DAUBENY (Chas.) On the Public Institutions for the advancement of Agricultural Science which exist in other countries, and on the plans which have been set on foot by individuals with a similar intent in our own. 8vo. *London* 1842.	The Author.
——— Lecture on the application of Science to Agriculture, delivered before the Members of the Royal Agricultural Society of England on the 9th December 1841. 8vo. *London* 1842.	———
DAUSSY (M.) Mémoire Déscriptif de la Route de Teheran à Meched et de Meched à Jezd, reconnue en 1807; par M. Truilhier, capitaine au Corps du Génie: suivi d'un mémoire sur les observations faites en 1807, par le Capitaine Truilhier, dans son voyage en Perse, accompagné de quatre cartes itinéraires. 8vo. *Paris* 1841.	The Author.
——— Table des Positions Géographiques des principaux Lieux du Globe: extrait de la Connaissance des Temps de 1844. 8vo. *Paris.*	———
DAVY (John.) On the Property belonging to Charcoal and Plumbago (in fine plates and particles) of transmitting Light. 4to. *Edinburgh* 1843.	The Author.
——— Notes and Observations on the Ionian Islands and Malta, with some remarks on Constantinople and Turkey, and on the system of Quarantine as at present conducted. 8vo. *London* 1842.	———
DEMIDOFF (A de.) Voyage dans la Russie Méridionale et la Crimée, Tome II. et IV., avec des planches. 8vo et fol. *Paris* 1842.	The Author.
DE MORGAN (A.) The Differential and Integral Calculus. 8vo. *London* 1842.	The Author.
——— Part II. General Information on subjects of Chronology, Geography, Statistics, &c.	———
——— References for the History of the Mathematical Sciences. 12mo. *London* 1842.	———
DENT (E. J.) On the Errors of Chronometers, and explanation of a new construction of the Compensation-Balance. 8vo. *London* 1842.	The Author.
——— On the Errors of the Chronometrical Thermometer. 8vo. *London* 1843.	———
DILLWYN (L. W.) Hortus Collinsonianus; an Account of the Plants cultivated by the late Peter Collinson, Esq., F.R.S., arranged alphabetically according to their modern names, from the catalogue of his garden and other manuscripts. Not published. 8vo. *Swansea* 1843.	The Editor.
DOLLARD (W.) General and Medical Topography of Kalee, Kemaoon and Shore Valley, with sketches of the Cantonments of Lohooghaut and Petoragurh, as also of the Roads, Rivers, Bungallows, &c. of part of the District. 8vo. *Calcutta* 1840.	The Directors of the East India Company.
DOPPLER (C.) On the Coloured Light of Double Stars, and of other Stars of the Heavens. 4to. *Prag.* 1842.	The Author.
DOUGLAS (G.) An Anatomical Exposition of the Structure of the Human Body, 2 vols.; by James Benignus Winslow: translated from the French original; 5th edition. 8vo. *Edinburgh* 1763.	J. C. Carpue, Esq., F.R.S.
DUTROCHET (M.) Recherches Physiques sur la Force Épipolique, 2me partie. 8vo. *Paris* 1843.	The Author.
ELLIS (Alex. J.) The Spirit of Mathematical Analysis, and its relation to a	The Translator.

Presents.	Donors.
logical system: by Dr. Martin Ohm; translated from the German. 8vo. *London* 1843.	
ENCKE (J. F.) The Berlin Ephemeris for 1845. 8vo. *Berlin* 1842.	The Author.
ERMAN (A.) Voyage round the Earth, through Northern Asia and the two Oceans, in 1828–1830.—2nd Division. Physical Observations.—Vol. II. Inclination and Intensity, Declination Observations taken at Sea, and Periodical Changes. 8vo. *Berlin* 1841.	The Author.
FARADAY (M.) Chemical Manipulation; being instructions to Students in Chemistry on the methods of performing experiments of demonstration or research with accuracy and success: 3rd edition. 8vo. *London* 1842.	The Author.
FERRARI (Jos.) Medical Statistics of Milan, from the 15th century to the present day. Vol. I. Parts 1 to 12; and Vol. II. Parts 1 to 6. 8vo. *Milan* 1838–1842.	The Author.
———— Documents referring to the Chemical Statistics of the Hospitals of Italy. 8vo. *Milan* 1842.	————
FIGEAC (Champollion.) Écriture Démotique Égyptienne. Lettre de M. Champollion Figeac à M. Ch. Lenormant, le 7 Février 1843. 4to. *Paris* 1843.	The Author.
FLOURENS (P.) Recherches sur le Développement des Os et des Dents. 4to. *Paris* 1842.	The Author.
FRANKENHEIM (M. L.) System of Crystals. 4to. *Breslau* 1842.	The Author.
GAVIN (H.) On Feigned and Factitious Diseases, chiefly of Soldiers and Seamen; on the means used to simulate or produce them, and on the best modes of discovering impostors. 8vo. *London* 1843.	The Author.
GIRALDUS (J. A.) Note sur la Terminaison des Bronches (with a plate). 8vo. *Paris* 1839.	The Author.
GOBBI (F.) On the Dependence of the Physical Energy of Population upon the most simple elements of nature, with a special application to the population of Belgium. 4to. *Leipzig and Paris* 1842.	The Author.
GODWIN (G.) Two Letters of certain Marks discoverable on the Stones of various Buildings erected in the Middle Ages; communicated to the Society of Antiquaries. 4to. *London* 1843.	The Author.
———— A Chapter on Church Building; being comments on some opinions thereon recently published. 12mo. *London*.	————
———— Buildings in Belgium. 12mo. *London*.	————
GOULD (J.) A Century of Birds from the Himalaya Mountains;	The Author.
———— A Monograph of the Ramphastidæ, or Family of Toucans; and	
———— A Monograph of the Trogonidæ, or Family of Trogons. folio.	
———— The Birds of Australia, Nos. 7, 8, 9, 10, 11. folio. *London* 1842.	The Most Honourable the Marquis of Northampton, Pres. R.S.
GRAVES (T.) Chapters on Roman and Canon Law. 4to. *London*.	The Author.
GRAY (John E.) The Zoology of the Voyage of H.M.S. Sulphur, under the command of Captain Sir Edward Belcher, R.N., C.B., &c. during the years 1836–1842; edited by Richard B. Hinds, Esq., Surgeon attached to the Expedition. (No. 1, Mammalia.) 4to. *London* 1843.	The Author.
———— Fauna of New Zealand. Materials towards a Fauna of New Zealand, Auckland Island, and Chatham Island.	————
———— Notes on the Materials at present existing towards a Fauna of New Zealand. 8vo.	————
———— Figures of Molluscous Animals, selected from various	————

Presents.	Donors.
Authors: etched for the use of Students, by Maria Emma Gray. Vol. I., with Explanations. 8vo. *London* 1842.	
GRIFFITH (W. P.) Geometrical Proportion of Architecture. Grecian Architecture. Suggestions for the developing the Temples of Greece, by Geometrical Proportion; forming a sequel to all their harmony and beauty. folio. *London* 1843.	The Author.
HALLIWELL (Jas. O.) The First Sketches of the Second and Third Parts of King Henry the Sixth: edited by James Orchard Halliwell, Esq., F.R.S., &c. 8vo. *London* 1843.	The Editor.
——— The Foundation Documents of Merton College, Oxford; collected by James Heywood, F.R.S.: edited by James Orchard Halliwell, Esq., F.R.S. 8vo. *London* 1843.	———
HANSEN (M.) Explanation of a mode of computing the Absolute Perturbations of the Heavenly Bodies which move in orbits of Elliptical Eccentricity.	The Author.
HANSTEEN (C.) Of the Changes which the Magnetic Rod undergoes, arising both from the variation of Time and Temperature. 4to. *Christiania* 1842.	The Author.
——— A Periodical Variation of the Horizontal Magnetic Intensity dependent upon the length of the ascending Moon's Nodes. 8vo. 1839.	———
HARE (Robert.) A Letter to Professor Whewell, in reply to certain allegations and arguments advanced in a pamphlet entitled, A Demonstration that all Matter is heavy. 8vo. *Philadelphia.*	The Author.
——— An Effort to refute the Arguments advanced in favour of the Existence in the Amphido Salts, or Radicals, consisting, like Cyanogen, of more than one Element. 8vo. *Philadelphia* 1842.	———
——— Strictures on Professor Dove's Essay 'On the Law of Storms.' 8vo. *Philadelphia.*	———
——— Objections to Mr. Redfield's Theory of Storms, with some strictures upon his reasoning. 8vo. *Philadelphia.*	———
——— Additional Objections to Redfield's Theory of Storms. 8vo. *Philadelphia.*	———
HARRIS (W. Snow.) On the Nature of Thunder Storms; and on the means of protecting Buildings and Shipping against the destructive effects of Lightning. 8vo. *London* 1843.	The Author.
HASSLER (F. R.) Report upon the Standards of the Liquid Capacity Measures of the system of uniform standards for the United States; with a description of a new original Barometer, and of the balance for adjusting the half bushels by their weight of distilled water. 8vo. *Washington* 1842.	The Author.
HEMSÖ (J. G. de.) Observations Authentiques sur la Peste du Levant et sur la vertu spécifique de l'huile d'olive contre cette effrayante maladie rédigées pour la seconde réunion scientifique Italienne séant à Turin en Septembre 1840. 8vo. *Florence* 1841.	The Author.
——— Notice sur la Race de Dromadaires existant dans le Domaine de San Rossore, près de Pise en Toscane. 8vo. *Paris* 1840.	———
——— The recent Progress of Geography. 8vo. *Milan* 1841.	———
HERSCHEL (Sir J. F. W.) On the Action of the Rays of the Solar Spectrum on the Daguerréotype Plate. 8vo. *London* 1843.	The Author.

Presents.	Donors.
HEYGATE (James.) On Tic Douloureux, or Neuralgia, together with a few cursory remarks on intermittent fever, and its supposed connexion with the former. 8vo. *Edinburgh* 1836.	The Author.
HITCHCOCK (E.) Final Report on the Geology of Massachusetts. 2 vols. 4to. *Amherst* 1841.	Edward Everett, Esq.
HOFLER (C.) Observations on the Causes of the Decline of German Commerce during the sixteenth and seventeenth centuries. 4to. *München* 1842.	The Author.
HOGG (J.) A Catalogue of Sicilian Plants; with some remarks on the Geography, Geology, and Vegetation of Sicily. 8vo. *London* 1842.	The Author.
HOLTZAPFFEL (C.) Turning and Mechanical Manipulation, intended as a work of general reference and practical instruction, on the Lathe, and the various mechanical pursuits followed by amateurs. 8vo. *London* 1843.	The Author.
HOOD (C.) On some peculiar Changes in the internal structure of Iron, independent of and subsequent to the several processes of its manufacture. 12mo. *London* 1842.	The Author.
——— On the Properties and Chemical Constitution of Coal; with remarks on the various methods of increasing its calorific effects, and preventing the loss which occurs during its combustion. 8vo. *London* 1841.	———
——— A Practical Treatise on warming Buildings by Hot Water; and an inquiry into the laws of radiant heat and conducted heat: to which are added, Remarks on Ventilation, and on the various methods of distributing Artificial Heat, and their effects on animal and vegetable physiology. 8vo. *London* 1837.	———
HOSKING (W.) Essay and Treatises on the Practice and Architecture of Bridges. 8vo. *London* 1842.	The Author.
——— An Introductory Lecture, delivered at King's College, London, January 24, 1842, on the principles and practice of Architecture. To which are now added a few Notes, and some further remarks on the modern practice of competition 8vo. *London* 1842.	———
HOSKINS (S. Elliott.) Tables for the extemporaneous application of Corrections for Temperature to Barometric Observations, deduced from the tables published in the Report of the Committee of Physics, Royal Society. 8vo. *Guernsey* 1842.	The Author.
——— On the Chemical Discrimination of Vesical Calculi; by E. A. Scharling; translated from the Latin, with an Appendix, containing practical directions for the recognition of Calculi (with plates). 8vo. *London* 1842.	The Translator.
IRVINE (R. H.) Some Account of the General and Medical Topography of Ajmeer. 8vo. *Calcutta* 1841.	The Directors of the East India Company.
JACOBI (M. H.) Upon some Electromagnetical Apparatus. Upon my own Electromagnetical Labours in 1841. Description of an improved Voltagometer. A Method for determining the Constants of the Voltaic Chain. Upon the Development of Galvanoplasticks. Notes upon Galvanic Conductors. 8vo. *St. Petersburg* 1841–1842.	The Author.
——— Sur les Remarques de M. Becquerel rélatives à ma mesure comparative de l'action de deux Couples Voltaïques, l'un cuivre-zinc, l'autre platine-zinc. 8vo. *St. Petersbourg* 1841.	———
JAY (W.) War and Peace; the evils of the first, and a plan for preserving the last. 8vo. *London* 1842.	John Lee, F.R.S.

Presents.	Donors.
JEFFREYS (J.) Views upon the Statics of the Human Chest, Animal Heat, and Determinations of Blood to the Head. 8vo. *London* 1843.	The Author.
JOHNSON (Cuthbert W.) The Farmer's Encyclopædia and Dictionary of Rural Affairs. 8vo. *London* 1842.	The Author.
JOHNSON (M. J.) Astronomical Observations made at the Radcliffe Observatory, Oxford, in the year 1840. Vol. I. 8vo. *Oxford* 1842.	The Radcliffe Trustees.
JONES (T. W.) Observations on some points in the Anatomy, Physiology and Pathology of the Blood. 8vo. *London* 1842.	The Author.
JOURNALS.	
The Annals of Electricity, Magnetism and Chemistry; and Guardian of Experimental Science. Nos. 45 to 55. Conducted by Wm. Sturgeon. 8vo. *London* 1842–1843.	The Editor.
The "Astronomische Nachrichten." Nos. 447 to 477. 4to. *Altona* 1843.	Prof. Schumacher, For. Mem. R.S.
Athenæum for the year 1842.	The Editor.
The British and Foreign Medical Review, or Quarterly Journal, on Practical Medicine and Surgery. Nos. 27, 28, 29 and 30. Edited by John Forbes, M.D., F.R.S. 8vo. *London* 1843.	The Editor.
The Chemical Gazette; or Journal of Practical Chemistry, in all its applications to Pharmacy, Arts and Manufactures. No. 1. Conducted by W. Francis and H. Croft. 8vo. *London* 1842.	The Editors.
Journal of the Asiatic Society of Bengal. Nos. 34 to 38, 40 to 43, with Supplement to No. 42, and Nos. 123–128. 8vo. *Calcutta* 1842.	The Society.
Journal de l'École Royale Polytechnique, publié par le Conseil d'instruction. Tome XVII. 4to. *Paris* 1841.	L'École Polytechnique.
Journal of Natural Events in Physiology and Geology. Vol. IX. Parts 2–4. Vol. X. p. 1. Edited by Drs. Van Hoeven and Vriese. 8vo. *Leiden* 1842.	The Editors.
Literary Gazette for the year 1842. 4to. *London* 1842.	The Editor.
London, Edinburgh and Dublin Philosophical Magazine and Journal of Science. 8vo. *London* 1842.	The Editor.
Journal of Meteorology and Magnetism. Parts 1–3. 1842. Edited by Dr. J. Lamont. 8vo. *Munich* 1842.	The Editor.
Microscopic Journal. Edited by George Busk. 8vo. *London* 1843.	The Editor.
Numismatic Chronicle and Journal of the Numismatic Society: edited by John Yonge Akerman, F.S.A. Nos. 12 to 19. 8vo. *London* 1841–1843.	The Society.
Polytechnic Review, Nos. 1 to 6. 4to. *London* 1843.	The Editor.
Quarterly Journal of Meteorology and Physical Science, No. 6; edited by J. W. G. Gutch. 8vo. *London* 1843.	The Society.
Tasmanian Journal of Natural Science, Agriculture, Statistics, &c. Vol. I. No. 2. 8vo. *Van Diemen's Land* 1842.	Sir John Franklin, F.R.S.
United Service Journal and the Repertory of Patent Inventions, for July and August 1842. 8vo. *London* 1842.	The Editors.
Zoologist: an Illustrated Monthly Magazine of Natural History and Journal for recording facts and anecdotes relating to Quadrupeds, Birds, &c. No. 1, edited by Edward Neuman. 8vo. *London* 1843.	The Editor.
KOENE (C. J.) Un Mot de Réponse à la Critique publiée sous le titre de Compte Rendu de l'ouvrage de M. L. de Koninck, M.D. &c. 8vo. *Liège* 1842.	The Author.
KREIL (Karl.) Magnetical and Meteorological Observations made at Prague from 1st August 1840 to 31st July 1841. 4to. *Prag.* 1842.	The Author.

Presents.	Donors.
KUPFFER (A.) Annuaire Magnétique et Météorologique du Corps des Ingénieurs des Mines de Russie. 4to. *St. Petersbourg* 1842.	The Russian Minister of Finances.
LADD (W.) An Essay on a Congress of Nations, for the adjustment of international disputes without resort to Arms. 8vo. *London* 1840.	Dr. John Lee, F.R.S.
LAMONT (Dr.) On the Magnetic Observations of the Royal Astronomical Observatory at Munich. 4to. *München* 1841.	The Author.
——— Determination of the Horizontal Intensity of Terrestrial Magnetism. 4to. *München* 1842.	———
LARREY (M. le Baron.) Mémoire sur l'Extirpation des Glandes Salivaires (la parotide et la sous-maxillaire), nécessitée par l'engorgement scrofuleux et squirreux de ces glandes. 4to. *Paris* 1841.	The Author.
LE COUTEUR (Col.) On the Use of the great Jersey Trench Plough, exhibited at the Society's Annual Meeting, in July 1841. 8vo. *London* 1842.	The Author.
——— On the Culture of the Parsnip. 8vo. *London* 1840.	———
——— On Hoeing Wheat. 8vo. *London*.	———
——— On the Varieties, Properties, and Classification of Wheat. 8vo. *Jersey*.	———
——— Prize Essay. On pure and improved Varieties of Wheat lately introduced into England. 8vo. *London* 1839.	———
LEE (Isaac.) Observations on the genus Unio, together with descriptions of new species in the families Naïades, Colimacea, Lymnæana, Melaniana and Peristomiana. Vol. III. 4to. *Philadelphia* 1842.	The Author.
——— Description of Nineteen new Species of Colimacea. 4to. 1840.	———
LETHEBY (H.) An Account of the Dissection of a Gymnotus Electricus. 8vo. *London* 1842.	Dr. Pereira, F.R.S.
LE VERRIER (U. J.) Mémoire sur les Variations Séculaires des Éléments des Orbites, pour les sept Planètes principales, Mercure, Vénus, la Terre, Mars, Jupiter, Saturne et Uranus. 8vo. *Paris* 1839.	The Author.
——— Mémoire sur la Détermination des Inégalités Séculaires des Planètes. 8vo. *Paris* 1840.	———
——— Développements sur plusieurs points de la Théorie des Perturbations des Planètes. No. 1 à 3. 4to. *Paris* 1841.	———
LITTROW (C. L. von.) Annals of the Royal Observatory of Vienna. Vol. XXI. New Series. 4to. *Wien* 1841.	The Author.
LLOYD (Rev. H.) On the Determination of the Intensity of the Earth's Magnetic Force in absolute measure. 4to. *Dublin* 1843.	The Author.
——— Account of the Induction Inclinometer and of its adjustments. 8vo. *London* 1842.	———
LOCKHART (James.) Resolution of Equations by means of inferior and superior Limits. 4to. *London* 1842.	The Author.
LONGCHAMPS (E. de Selys.) Faune Belge, 1re partie, indication méthodique des mammifères, oiseaux, reptiles et poissons observés jusqu'ici en Belgique. 8vo. *Liège* 1842.	The Author.
LITTON (Victor.) Voyage en Islande et au Groënland exécuté pendant les années 1835 et 1836 sur la corvette la Recherche. 8vo and folio. *Paris* 1840.	The Author.
McWILLIAM (J. O.) Medical History of the Expedition to the Niger during the years 1841–2, comprising an account of the Fever which led to its abrupt termination. 8vo. *London* 1843.	The Author, through Sir Wm. Burnett, Knt., F.R.S.

Presents.	Donors.
MAPS AND CHARTS.	
Ordnance Maps, in continuation of the Trigonometrical Survey of Great Britain. Sheets. Nos. 80, 81 and 90. folio. *London.*	The Master-General of the Ordnance.
A Chorographical Chart of the Diocese of Mühel, in Austria, around the Enus: by B. Pillwein. Large folio sheet.	The Author.
MARTIUS (Dr. von.) The Epidemic among Potatoes during recent years. 4to. *München* 1842.	The Author.
MATTEUCCI (C.) Essai sur les Phénomènes Électriques des Animaux. 8vo. *Paris* 1840.	Baron Humboldt, For. Mem. R.S.
Deuxième Mémoire sur le Courant Électrique propre de la Grenouille et sur celui des animaux à sang chaud. 8vo. *Paris* 1841.	———
MÉNABRÉA (L. F.) Discours sur la Vie et les Ouvrages du Chevalier George Bidone, prononcé à l'Académie Royale des Sciences de Turin du 12 Décembre 1841. 4to. *Turin* 1842.	Prof. Plana, For. Mem. R.S.
MIRBEL (M. de.) Nouvelles Notes sur le Cambium; extraites d'un Travail sur l'Anatomie de la Racine du Dattier. 4to. *Paris* 1842.	The Author.
MORTON (S. G.) Crania Americana; or a Comparative View of the Skulls of various Aboriginal Nations of North and South America. folio. *Philadelphia* 1839.	The Author.
——— Catalogue of Skulls of Man, and the inferior Animals, in the Collection of Samuel George Morton, M.D. 8vo. *Philadelphia* 1840.	———
——— Remarks on the so-called Pigmy Race of the Valley of the Mississippi. 8vo.	———
——— An Inquiry into the Distinctive Characteristics of the Aboriginal Race of America. 8vo. *Boston* 1842.	———
——— Some Remarks on the Ancient Peruvians. 8vo. *Philadelphia* 1842.	———
——— Description of some New Species of Organic Remains of the Cretaceous Group of the United States, with a Tabular View of the Fossils hitherto discovered in that Formation. 8vo. *Philadelphia* 1842.	———
MOSELEY (Rev. H.) The Mechanical Principles of Engineering and Architecture. 8vo. *London* 1843.	The Author.
MÜLLER (J.) On the smooth Shark of Aristotle, and of the Difference between the Sharks and Rays in the Development of the Egg. folio. *Berlin* 1842.	The Author.
MURCHISON (R. I.) Address delivered at the Anniversary Meeting of the Geological Society of London on the 17th February 1843. 8vo. *London* 1843.	The Author.
NAMIAS (G.) Observations upon some Effects of Electricity upon the Animal Economy, and especially with reference to Human Maladies. 8vo. *Venice* 1841.	The Author.
——— Academical Report made at the Sitting of the Athenæum of Venice. 4to. *Venice.*	———
O'SHAUGHNESSY (W. B.) Report on the Chemical Pathology of the Malignant Cholera, containing analyses of the blood, dejections, &c. of patients labouring under that disease in Newcastle and London, &c. 8vo. *London* 1832.	The Author.
——— On the Preparations of the Indian Hemp, or Gunjah (*Cannabis Indica*), their effects on the animal system in health,	———

PRESENTS.	DONORS.
and their utility in the treatment of tetanus and other convulsive disorders 8vo. *Calcutta* 1839.	
O'SHAUGHNESSY (W. B.) Memoranda relative to Experiments on the Communication of Telegraphic Signals by induced Electricity. 8vo. *Calcutta* 1839.	The Author.
——— Memorandum of Experiments on the Explosion of Gunpowder under water by the Galvanic Battery, with a notice of the successful destruction of the wreck of the "Equitable," at Fultah Reach. 8vo. *Calcutta* 1840.	———
——— Notes of Lectures on Natural Philosophy. First Series, On Galvanic Electricity. 12mo. *Calcutta* 1841.	———
——— The Bengal Dispensatory and Companion to the Pharmacopœia. 8vo. *London* 1842.	———
PASSERINI (Dr. C.) Notice of the Increase in Florence during 1837, 1838, and 1839, of the American Bird Paroaria Cucullata, commonly called the Cardinal. folio. *Firenze* 1841.	The Author.
——— Observation upon two Noxious Insects. 12mo. *Firenze* 1840.	———
——— Observations upon the Larvæ, Nymph and Habits of Scolia Flavifrons. 4to. *Pisa* 1840.	———
——— Continuation of the Observations upon the Larvæ of Scolia Flavifrons. 4to. *Firenze* 1841.	———
PATERNO (P. de Jovis da.) Upon the Cultivation of Grain, with observations referring to the kingdom of Naples. 8vo. *Naples* 1838.	The Author.
PEACOCK (G.) A Treatise on Algebra. Vol. I. Arithmetical Algebra. 8vo. *Cambridge* 1842.	The Author.
PEREIRA (J.) Lecture on the Elementary Composition of Foods, &c. &c. 8vo. *London* 1842.	The Author.
PICTET (F. G.) Histoire Naturelle Générale et Particulière des Insectes Neuroptères, livraisons 8—11. 8vo. *Genève* 1841.	The Author.
PLANA (J.) Mémoire sur la Chaleur des Gaz Permanens. 4to. *Turin* 1842.	The Author.
POLE (W.) An Investigation of the comparative Loss by Friction in beam and direct action Steam Engines. 8vo. *London* 1843.	The Author.
PONCELET (M.) Cours de Mécanique appliquée aux Machines, Sections 1 à 7. 2 vols. folio. (Lithographed.) folio. *Paris* 1836.	The Author.
——— Mémoire sur la Stabilité des Revêtements de leurs Fondations. (Two copies.) 8vo. *Paris* 1840.	———
PORTA (L.) Solution of an important Problem in Geology, with an examination of the flowing and ebbing of the Sea. 12mo. *Naples* 1839.	The Author.
PORTER (G. R.) The Progress of the Nation, in its various social and economical relations, from the beginning of the nineteenth century to the present time, Sections 5 to 8. 8vo. *London* 1843.	The Author.
POTTER (T. R.) The History and Antiquities of Charnwood Forest, with an Appendix on the Geology, Botany, and Ornithology of the District. 4to. *London* 1842.	The Author.
POWELL (Rev. B.) On the Theory of Parallel Lines. 8vo. *Oxford* 1842.	The Author.
POWER (Rev. J.) Mode of preventing the disastrous Effects of Collision; preceded by an inquiry into the causes of the Brighton Railway accident. 4to. *Cambridge* 1842.	The Author.

Presents.	Donors.
QUAIN (R.) The Anatomy of the Arteries of the Human Body, with its applications to Pathology and Operative Surgery in lithographic drawings, with practical commentaries. fol. and 8vo. *London* 1840.	Thomas Graham, Esq., F.R.S.
QUETELET (A.) Sur la Différence des Longitudes des Observatoires Royaux de Greenwich et de Bruxelles, déterminée au moyen de chronomètres; par M.M. Sheepshanks et Quetelet. 4to. *Bruxelles* 1842.	Prof. Quetelet, For. Memb. R.S.
——————— Notes sur les Instruments employés dans les diverses Stations pour les Observations Météorologiques horaires correspondantes des Équinoxes et des Solstices. 4to. *Bruxelles* 1842.	The Author.
——————— Résumé des Observations Météorologiques et Magnétiques faites à des époques déterminées. 4to. *Bruxelles* 1842.	———
——————— Annales de l'Observatoire Royale de Bruxelles, Tome II. 4to. *Bruxelles* 1842.	———
——————— Recueil d'Observations sur différents Sujets des Sciences Physiques. 8vo. *Bruxelles* 1842.	———
——————— Astronomie. Eclipse Solaire du 8 Juillet 1842; notice communiquée. 8vo. *Bruxelles* 1842.	———
——————— Etudes sur l'Homme. 8vo. *Bruxelles* 1842.	———
RAMSAY (G.) An Inquiry into the Principles of Human Happiness and Human Duty, in two books. 8vo. *London* 1843.	The Author, through Dr. John Lee, F.R.S.
REDFIELD (W. C.) On Whirlwind Storms: with replies to the objections and strictures of Dr. Hare. 8vo. *New York* 1842.	The Author.
——————— Reply to Dr. Hare's further Objections relating to Whirlwind Storms; with some evidence of the whirling action of the Providence Tornado of August 1838. 8vo.	———
RICHARDSON (J.) Icones Piscium, or Plates of Rare Fishes. 4to. *London* 1843.	The Author.
RIESS (P.) Sur les Figures Roriques et les Bandes Colorées produites par l'Électricité. 8vo. *Genève.*	Prof. Wartmann.
ROBINSON (Rev. T. R.) Report made at the annual Visitation of the Armagh Observatory. 8vo. *Armagh* 1842.	The Author.
ROBINSON (F.) Refutation of Lieut. Wellsted's Attack upon Lord Valentia's (now Earl of Mount Norris) work upon the Red Sea, with comparative diagrams, showing the inventions of Bruce. 4to. *London* 1842.	The Author.
RÜMKER (Chas.) Upon the Meridian Places of 12,000 fixed Stars for the commencement of 1836, deduced from the Observations at the Hamburgh Observatory. Oblong. *Hamburgh* 1843.	The Author.
SAGRA (Ramon de la.) Notice sur l'Organisation Actuelle de l'Industrie en Belgique, et sur la nécessité de sa réforme; lus dans les séances des 6 et 20 Août 1842. 8vo. *Paris* 1842.	The Author.
——————— Rapports Statistiques déduits du Récensement de la Population des États Unis en 1840. Large sheet.	The Author.
——————— Histoire Physique, Politique et Naturelle de l'Ile de Cuba: première partie. Histoire Physique et Politique. Tome I. 8vo. *Paris* 1842.	The Author, through Dr. Marshall Hall, F.R.S.
——————— Observations et Comparaisons Statistiques sur la Mouvement de la Population de la Havane dans les cinq ans écoulés de 1825 à 1830. 8vo. *Paris* 1842.	The same.

Presents.	Donors.
SCHMIDT (J. G.) Système d'Arcs Elliptiques pour faciliter le calcul intégral et pour constituer des nombres astronomique calculé. 4to. *Berlin* 1842.	The Author.
SCHWANN (M.) Instructions pour l'Observation des Phénomènes Périodiques de l'Homme. 8vo. *Bruxelles.*	The Author.
SCHWEIGGER (J. S. C.) Address to the President and Vice-Presidents of the Academy Leopoldino-Carolinæ Naturæ Curiosorum. 4to. *Halæ.*	The Author.
——— Speech made at the Academy at Halle. 4to. *Halle.*	———
——— Introduction to Mythology, viewed with reference to Natural Science. 8vo. *Halle* 1836.	———
SERINGUE-TOME (N. C.) Le Petit Agriculteur, ou traité élémentaire d'agriculture. Vols. I., II. 12mo. *Paris* 1841.	The Author.
SHUTTLEWORTH (J. G.) The Hydraulic Railway, being a carefully digested but plain statement of the advantages to be derived, and impediments removed, in establishing Hydraulic Propulsions on Railways. 8vo. *London* 1842.	The Author.
SIMMS (F. W.) A Treatise on the Principles and Practice of Levelling, showing its application to purposes of civil engineering, particularly in the construction of roads; with Mr. Telford's rules for the same. 2nd edition. 8vo. *London* 1843.	The Author.
SIMONOFF (—.) Observations Astronomiques faites à l'Observatoire de l'Université de Kazan; premier cahier. 4to. *Kazan* 1842.	The Author.
SMEE (A.) Elements of Electro-Metallurgy, or the art of working in metals by the galvanic fluid. Parts 4 to 9. 8vo. *London* 1842.	The Author.
——— On the Treatment by Tartarized Antimony. 8vo. *London.*	———
——— On the Inhalation of Ammonia Gas as a Remedial Agent. 8vo. *London* 1843.	———
SMITH (J. Pye.) On the Relation between the Holy Scriptures and some Parts of Geological Science. Third edition. 12mo. *London* 1843.	The Author.
SMITH (W.) Dictionary of Greek and Roman Biography and Mythology. Parts 1. and 2: edited by Wm. Smith, Ph. D. 8vo. *London* 1843.	The Editor.
SOLLY (Edward.) Rural Chemistry, an elementary introduction to the study of the science in its relation to Agriculture. 12mo. *London* 1843.	The Author.
——— First Report of the Chemical Committee of the Horticultural Society of London, 1842. 8vo. *London* 1842.	———
SPENGEL (L.) On the Study of Rhetoric by the Ancients. 4to. *München* 1842.	The Author.
STAMBUCCHI (R.) The Milan Astronomical Ephemeris for the year 1843. 8vo. *Milan* 1842.	The Author.
STICHANER (J.) History of Bavarian Subsidien from 1740 to 1762. 4to. *München* 1842.	The Author.
STOBELL (F. von.) Galvanography, a method to multiply in printing painted drawings, by means of copper plates. 4to. *München* 1842.	The Author.
STRUVE (O.) Mémoire sur l'Évaluation Numérique de la Constante de la Précession des Équinoxes. 8vo. *St. Peters.* 1841.	The Author.
——— Report of the Academician Struve upon the Memoir of C. A. F. Peters upon the Constant Number of the Nutations deduced from the Right Ascension of the Polar Star in the Observatory at Dorpat, from 1822 to 1838. 4to. *St. Petersburg.*	———
——— Notice sur l'Instrument des Passages de Repsold, établi à	———

Presents.	Donors.
l'Observatoire de Poulkova dans le premier vertical, et sur les résultats que cet instrument a donnés pour l'évaluation de la constante de l'aberration. 4to. *St. Petersbourg.*	
STRUVE (O.) Determination of the Constants of Precession with respect to the peculiar motions of the Solar System. 4to. *St. Petersburg* 1842.	The Author.
STRUVE (F. G. W.) Astronomical Observations made at the University of Dorpat, for the years 1831 to 1838. Vol. VIII. 4to. *Dorpat* 1839.	The Author.
SYKES (Lieut.-Col. W. H.) Statistics of Civil and Criminal Justice in British India, chiefly from the year 1836 to 1840 inclusive. 8vo. *London* 1843.	The Author.
——— Buddhism versus Brahmanism; extracted from the Asiatic Journal for June 1842. 8vo.	———
TAYLOR (Jas.) A Sketch of the Topography and Statistics of Dacca; printed by the order of Government. 8vo. *Calcutta* 1840.	The Directors of the East India Company.
THORNTON (Edw.) The History of the British Empire in India. Vol. III. and IV. 8vo. *London* 1843.	The Author.
TILLEY (T. G.) Agricultural Chemistry rendered simple for Practical Purposes, illustrated with Notes. Parts 1 to 4. 8vo. *Chelmsford* 1843.	The Author
TRUDI (N.) Essay upon Polygons inscribed within circumscribed Conical Curves. 4to. *Naples* 1841.	The Author.
——— The Problem of describing a Polygon within a Conical Curve. 4to. *Naples* 1841.	———
——— Theorem upon Conic Sections, useful for the resolution of difficult problems. 4to. *Naples* 1840.	———
TURNER (Edward.) Elements of Chemistry. 8vo. *London* 1842.	The Editors.
TWINING (W.) Some account of Cretinism and the Institution for its Cure, on the Abendberg, near Interlachen, in Switzerland. 12mo. *London* 1843.	Richard Twining, Esq., F.R.S.
VALENCIENNES (M. A.) Nouvelles Recherches sur le Nautile Flambé (*Nautilus Pompilius*, Lam.). 4to. *Paris* 1839.	The Author.
WALCKENAER (M.) Mémoire sur la Chronologie de l'Histoire des Javanais, et sur l'Époque de la Fondation de Madjapahit. 4to. *Paris* 1842.	The Author.
WALDHEIM (G. Fischer de.) Note upon the Eurypterus of Podolia and the Chirotherium of Livonia. 4to. *Moscow* 1839.	The Author.
WALSHE (W. H.) The Physical Diagnosis of Diseases of the Lungs. 12mo. *London* 1843.	The Author.
WALTHER (Dr.) Oration to the Memory of Dr. Dollinger. 4to. *München* 1841.	The Author.
WELD (C. R.) Statistical Companion to the Pocket-Book. 18mo. *London* 1843.	The Author.
WERNER (F.) Instruction for Gilding and Plating by means of Galvanism. 8vo. *St. Petersburg* 1842.	The Author.
WILLIAMS (R. F.) Lives of the Princes of Wales, Heirs to the British Throne; with notices of the Court and Camp of England from the thirteenth century, Vol. I. 8vo. *London* 1843.	The Author.
WILLICH (C. M.) Income Tax Tables, showing at sight the Amount of Duty at 7*d.* and 3½*d.* in the pound; accompanied by a variety of statistical information, extracted from parliamentary documents. 8vo. *London* 1842.	The Author.
——— Annual Supplement to Willich's Tithe Commutation Tables, 1843. 8vo. *London* 1843.	———
YOUNG (J. R.) Theory and Solution of Algebraical Equations of the higher orders (2nd edition). 8vo. *London* 1843.	The Author.

From November 1843 to June 1844.

Presents.	Donors.
ACADEMIES and SOCIETIES.	
Amsterdam :—	
Transactions of the Royal Institution for 1841. 4to. *Amsterdam.*	The Institution.
Transactions of the Royal Institute of Sciences at Amsterdam. Parts 1 and 2. 4to. *Amsterdam* 1843.	The Institute.
Berlin :—	
Proceedings of the Royal Academy of Sciences at Berlin, from May 1842 to December 1843. 8vo. *Berlin.*	The Academy.
Proceedings of the Royal Prussian Academy of Sciences at Berlin, for February 1844. 4to. *Berlin.*	The Academy.
Boston Journal of Natural History, No. 3, Vol. IV. 8vo. *Boston.*	The Editors.
Brussels :—	
Bulletins de l'Académie Royale de Bruxelles. Nos. 10, 11 and 12 of Vol. IX., and Nos. 1 to 7 of Vol. X. 8vo. *Bruxelles.*	The Academy.
Annuaire de l'Académie Royale des Sciences et Belles Lettres de Bruxelles. 18mo. *Bruxelles* 1843.	———
Nouveaux Mémoires de l'Académie Royale de Bruxelles. Tome XVI. 4to. *Bruxelles* 1844.	———
Mémoires Couronnés et Mémoires des Savants Étrangers, publiées par l'Académie Royale de Bruxelles. 4to. *Bruxelles* 1844.	———
Calcutta :—	
Journal of the Agricultural and Horticultural Society of India. Nos. 5, 6, 7 and 8. 8vo. *Calcutta.*	The Society.
Copenhagen :—Transactions of the Royal Danish Academy of Sciences at Copenhagen. Part 9. 4to. *Copenhagen.*	The Academy.
Cornwall :—Transactions of the Royal Geological Society of Cornwall. Vol. V. 8vo. *Falmouth* 1844.	The Society.
Dublin :—	
Proceedings of the Royal Irish Academy. Parts 2 and 3. 8vo. *Dublin* 1841.	The Academy.
Edinburgh :—	
Royal Society Transactions. Vol. XV. Part 3. 4to. *Edinburgh.*	The Society.
Geneva :—	
Mémoires de la Société de Physique et d'Histoire Naturelle de Genève. Tome X. 4to. *Genève.*	The Society.
Glasgow :—Proceedings of the Philosophical Society, for 1841–2. 8vo. *Glasgow.*	The Society.
Göttingen :—	
Transactions of the Royal Society, for 1838–1841. 4to. *Göttingen.*	The Society.
Helsingfors :—	
Acta Societatis Scientiarum Fennicæ. Tomi Primi Fasciculus 3. 4to. *Helsingfors* 1842.	
London :—	
Agricultural Society (Royal). Journal, Vol. IV. Part 2. 8vo. *London.*	The Society.

Presents.	Donors.
ACADEMIES and SOCIETIES (*continued*).	
Archæologia, published by the Society of Antiquaries of London. Vol. XXX. 4to. *London* 1844.	The Society.
Society of Arts. Transactions, Vol. LIV. 8vo. *London*.	The Society.
Asiatic Society (Royal). Journal, No. 14. 8vo. *London*.	The Society.
British Association for the Advancement of Science. Report of the Thirteenth Meeting. 8vo. *London* 1844.	The Association.
Memoirs and Proceedings of the Chemical Society. Parts 6, 7, 8. 8vo. *London* 1843.	The Society.
Memoirs of the Chemical Society of London for 1841–1842, and 1842–1843. 8vo. *London* 1843.	The Society.
Civil Engineers, Minutes of the Proceedings of, for 1842 and 1843. 8vo. *London*.	The Institution.
Council on Education, Minutes of the Committee, 1839 to 1842. 8vo. *London* 1841–2.	The Committee of Council.
Entomological Society of London. Transactions, Part 4 of Vol. III. 8vo. *London* 1844.	The Society.
Geological Society. Proceedings, Nos. 93, 94, 95, 96. 8vo. *London* 1844.	The Society.
Linnæan Society. Transactions, Vol. XIX. Part 2. 4to. *London* 1844.	The Society.
Royal Society of Literature. Transactions of. Second Series, Vol. I. 8vo. *London* 1844.	The Society.
Royal Medical and Chirurgical Society of London. Transactions, 2 Series, Vol. VIII. 8vo. *London* 1844.	The Society.
Microscopical Society of London. Transactions, Part 1. of Vol. I. 8vo. *London* 1844.	The Society.
Statistical Society of London. Journal, Parts 3 and 4 of Vol. VI. 8vo. *London* 1843–4.	The Society.
Lombardy :—Royal Institute. Journal of, Vols. I., II. and III. *Milan* 1842–3.	The Institute.
Royal Institute. Memoirs of, Vol. I. 4to. *Milan* 1844.	———
Lyons :—Annales des Sciences Physiques et Naturelles d'Agriculture et d'Industrie, publiées par la Société Royale d'Agriculture de Lyons. Tome IV. 8vo. *Lyons* 1838–1840.	The Society.
Manchester :—Memoirs of the Literary and Philosophical Society. Part 1 of Vol. VII.	The Society.
Moscow :—	
Bulletin de la Société Impériale des Naturalistes de Moscou, Nos. 3, 4, 1842, and Nos. 1, 2, 3, 1843. 8vo. *Moscou*.	The Society.
Nouveaux Mémoires de la Société Impériale des Naturalistes de Moscou. Tome VII. 4to. *Moscou*.	The Society.
Naples :—Transactions of the Royal Academy of Sciences. Part 5 of Vol. I. 4to. *Naples*.	The Academy.
Paris :—	
Notices et Extraits des Manuscrits de la Bibliothèque du Roi. Vol. XIV. 4to. *Paris* 1844.	The Institute.
Mémoires présentés par divers Savants à l'Académie Royale des Sciences. Vol. VIII. 4to. *Paris* 1844.	———
Mémoires présentés par divers Savants à l'Académie Royale des Inscriptions. Vol. I. Second Series. 4to. *Paris* 1844.	———

PRESENTS.	DONORS.
ACADEMIES and SOCIETIES (*continued*).	
Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences. Vol. XVI. 4to. *Paris* 1844.	The Institute.
Bulletins de la Société de Géographie. Tomes XVII. XVIII. et XIX. 8vo. *Paris* 1844.	The Society.
Mémoires de la Société Géologique de France. Tome V. Parts 1 and 2. 4to. *Paris* 1844.	The Society.
Bulletins de la Société Géologique de France, from September 1842 to May 1843, November and December, and January 1844. 4to. *Paris* 1844.	The Society.
Mémoire de l'Académie Impériale des Sciences de St. Pétersbourg. Vols. IV., V., VI., VII. 4to. *St. Pétersbourg*.	The Academy.
Recueil des Actes des Séances publiques de l'Académie Impériale des Sciences de St. Pétersbourg tenues le 31 Décembre 1841, et le 30 Décembre 1842. 4to. *St. Pétersbourg*.	———
Bulletin de la Classe Physico-Mathématique de l'Académie Impériale des Sciences de St. Pétersbourg. Tome I. 4to. *St. Pétersbourg*.	———
Philadelphia :—	
American Philosophical Society Transactions. Part 1 of Vol. IX. 4to. *Philadelphia* 1844.	The Society.
——— Proceedings. Vol. III. 8vo. *Philadelphia* 1844.	———
Journal of the Franklin Institute. Vols. I. III. and IV. 8vo. *Philadelphia* 1844.	The Institution.
Rotterdam :—	
New Transactions of the Academy of Sciences. Part 8. 4to. *Rotterdam* 1841.	The Society.
Venice :—	
Transactions of the Athenæum, 1841. 4to. *Venice* 1844.	The Athenæum.
ANONYMOUS :—	
A Descriptive Index of the Contents of Five Manuscript Volumes illustrative of the History of Great Britain, in the Library of Dawson Turner, Esq. 8vo. *London* 1844.	D. Turner, Esq.
Archives du Muséum d'Histoire Naturelle publiées par les Professeurs Administrateurs de cet Établissement. Part 4 of Vol. II., and Part 3 of Vol. III. 4to. *Paris* 1839 to 1843.	The Publishers.
Catalogue of the Library of the Royal Medical and Chirurgical Society. 8vo. *London* 1844.	The Society.
Catalogue of the Reptiles contained in the Museum at Fort-Pitt, Chatham. 8vo. *Chatham* 1843.	Sir James M'Grigor.
Connaissance des Temps ou des Mouvements Célestes pour l'an 1846. 8vo. *Paris* 1844.	Bureau des Longitudes.
Fifth Annual Report of the Registrar-General of Births, Deaths and Marriages. folio. *London* 1843.	The Registrar-General.
Lectures on Polarized Light, delivered before the Pharmaceutical Society of Great Britain, 1843. 8vo. *London* 1844.	The Author.
Letters and State Papers, chiefly addressed to George, Earl of Melville, Secretary of State for Scotland, 1689–1691. 4to. *Edinburgh* 1843.	The Hon. W. L. Melville.
List of the Specimens of Mammalia in the British Museum. 8vo. *London* 1844.	The Trustees of the British Museum.

Presents.	Donors.
ANONYMOUS (*continued*).	
List of the Oriental MSS. purchased in Turkey. 4to. *London* 1844.	Dr. Lee, F.R.S.
Meteorological Observations made at the Royal University of Kasan, 1835–1836.	
Observations des Marées faites à la mâture et au bassin dans le port de Brest, 1807–1835, publiées par le Bureau des Longitudes. 4to. *Paris* 1843.	Le Bureau des Longitudes.
Observations on Days of Unusual Magnetic Disturbance, made at the British Colonial Magnetic Observatories under the Departments of the Ordnance and Admiralty, printed by the British Government under the Superintendence of Lieut.-Col. Sabine, R.A. 4to. *London* 1843.	The Master General of the Ordnance.
Quelques Recherches sur la Chaleur Spécifique, par M.M. les Professeurs de la Rive et Marcet. 8vo. *Genève* 1844.	The Authors.
Report on the Medical Topography and Statistics of the Presidency Division of the Madras Army, compiled from the Records of the Medical Board Office. 8vo. *Madras* 1842.	The Directors of the East India Company.
Report of the Medical Topography and Statistics of the Centre Division of the Madras Army, compiled from the Records of the Medical Board Office. 8vo. *Madras* 1842.	———
Supplementary Additions to the Certainty of the Origin of Evil in the World, by a Layman. 12mo. *London* 1844.	The Author.
The Light Houses of the British Islands. 8vo. *London* 1844.	The Admiralty.
Tide Tables for the English and Irish Ports, 1844.	The Admiralty.
Views in China, Parts 18 to 20. 4to. *London* 1844.	Messrs. Fisher and Son.
ANSTED (D. T.) Geology, Introductory, Descriptive and Practical. 8vo. *London* 1844.	The Author.
ART, WORKS OF.	
A Marble Bust of the late Davies Gilbert, Esq., P.R.S., by Richard Westmacott, Esq., F.R.S.	The Baroness Bassett.
A Medallion of the late Major Rennell, F.R.S.	Lady Rodd.
A Solar Dial cut in Stone, made by the hand of Sir Isaac Newton, when a boy, and taken out of the Wall of the Manor House at Woolsthorpe, Lincolnshire, in which he was born.	Rev. C. Turnor, F.R.S.
ATKINS (Mrs.) Photographs of British Algæ. 4to. Parts 1, 2 and 3.	The Authoress.
BADANO (G.) New Researches upon the Resolution of Algebraic Equations.	The Author.
BAILIE (J. K.) Fasciculus Inscriptionum Græcarum. 4to. *London* 1844.	The Author.
BARLOW (E.) An exact Survey of the Tide, with 12 curious maps. 8vo. *London* 1717.	Sir John Lubbock, Bart.
BARLOW (Rev. John.) On Man's Power over himself to prevent or control Insanity. 12mo. *London* 1843.	The Author.
BECQUEREL (M.) Recherches sur la Chaleur Animale.	The Author.
BERZELIUS (Jac.) Annals of Mineralogy for 1841, 1842, 1843.	The Author.
BLAND (W.) Suppression of Spontaneous Combustion in Wool Ships. 8vo. *Sydney* 1843.	The Author.
BOHEMAN (C. H.) Annals of Zoology for 1840–1842.	The Author.
BOLYAY (M.) An Essay on Pure Mathematics. 2 vols. 8vo. 1833.	J. F. Stanford, Esq., F.R.S.
BOUSSINGAULT (J. B.) Economie Rurale, considerée dans ses Rapports avec la Chimie, la Physique et la Météorologie. 2 vols. 8vo. *Paris* 1844.	The Author.
BRANDRETH (T. S.) A Dissertation on the Metre of Homer. 8vo. *London* 1844.	The Author.

Presents.	Donors.
BROWN (Thos.) The Reminiscences of an Old Traveller throughout different parts of Europe. 8vo. *Edinburgh* 1843.	The Author.
BULARD (A.) De la Peste Orientale pendant les années 1838 à 1839. 8vo. *Paris* 1839.	Madame Bulard.
CAPELLI (G.) and BUZZETTI (C.) Effemeridi Astronomiche di Milano per l'anno 1844. 8vo. *Milano* 1844.	The Authors.
CASTELNAU (F. de.) Essai sur le Système Silurien de l'Amérique Septentrionale. 4to. *Paris* 1843.	The Author.
CAUCHY (A.) Exercices d'Analyse, et de Physique Mathématique, Parts 18, 19, 20, 21, 22, 23, and 24, of Vol. II. 4to. *Paris* 1840.	The Author.
CHALLIS (Rev. James.) Astronomical Observations made at the Observatory of Cambridge for 1840–1841. 4to. *Cambridge* 1837.	The Author.
CHASLES (C.) Sur le Passage du premier livre de la Géometrie de Boëce rélatif à un nouveau système de Numération. 4to. *Bruxelles* 1836.	The Author.
———— Mémoire sur la Géometrie des Hindous. 4to. *Bruxelles* 1836.	————
———— ———— Mémoire sur l'Attraction des Ellipsoïdes.	————
CHIMENTI (Antonio.) Elementi di Chimica, Vol. I. 8vo. *Roma* 1842.	The Author.
COSTA (O. G.) Corrispondenza Zoologica, redatta da. 8vo. *Napoli* 1839.	Signor Costa.
CRADDOCK (T.) Description of a Patent Universal Condensing Engine. 4to. *London* 1844.	The Author.
CURLING (T. B.) Case of a Girl who voided from the Urethra a number of Entozootic Worms not hitherto described, with an account of the Animals. 8vo. *London* 1844.	The Author.
DAUBENY (Dr.) A Lecture on Institutions for the better Education of the Farming Classes. 8vo. *Oxford* 1844.	The Author.
DAVY (Dr. John.) On the Specific Gravity of certain Substances commonly considered lighter than water. 4to. *Edinburgh* 1843.	
DENISON (J.) A New Theory of Gravitation.	The Author.
ENCKE (J. F.) Astronomisches Jahrbuch für 1846. 8vo. *Berlin* 1844.	The Author.
FEATHERSTONHAUGH (G.) Excursions through the Slave States in the United States of America, with Sketches of Popular Manners, and Geological Notices. 2 vols. 8vo. *London* 1844.	The Author.
FINCHAM (John.) A Treatise on Masting Ships and Mast-making. 8vo. *London* 1843.	The Author.
FORBES (J. D.) Travels through the Alps of Savoy and other parts of the Pennine Chain, with Observations on the Phenomena of Glaciers. 8vo. *Edinburgh* 1843.	The Author.
FORBES (Prof.) An Inaugural Lecture on Botany. 8vo. *London* 1843.	The Author.
FORSTER (T.) Essai sur l'Influence des Comètes sur les Phénomènes de la Terre. 8vo. *Bruges* 1843.	The Author.
FOWLER (R.) Observations on the Mental State of the Blind, Deaf and Dumb.	The Author.
FREYCINET (Louis de.) Voyage autour du Monde, fait par ordre du Roi; publiée sous les auspices de l'Amiral Duperrey. 4to. *Paris* 1826.	The Author.
FUSS (P. H.) Correspondance Mathématique et Physique de quelques célèbres Géomètres du dix-huitième siècle. 2 vols. 8vo. *St. Pétersbourg* 1843.	The Author.
GAIMARD (M. Paul.) Voyage en Islande et au Groënlande pendant les années 1835–36. 4to. *Paris* 1838.	The Author.

Presents.	Donors.
GAUDICHARD (M. Charles.) Premières Notes rélatives à la protestation faites dans la séance du 12 Juin 1843, à la suite de la lecture du Mémoire de M. de Mirbel, ayant pour titre, "Recherches Anatomiques et Physiologiques sur quelques Végétaux Monocotylés." 8vo. *Paris* 1844.	The Author.
——— Recherches Générales sur la Physiologie et l'Organogénie des Végétaux. 8vo. *Paris* 1844.	———
GILCHRIST (W.) Practical Memoirs on the History and Treatment of the Diseases of the Elephant and Camel. folio. *Calcutta* 1842.	The Directors of the East India Company.
GIVRY (M.) Instructions Nautiques; partie des Côtes Septentrionales de France comprise entre la pointe de Barfleur et Dunkerque. 4to. *Paris* 1844.	Le Bureau des Longitudes.
GODWIN (George, jun.) Architecture as a Fine Art: its State and Prospects in England.	The Author.
GOULD (John.) The Birds of Australia, Parts 14 and 15. large folio. *London* 1844.	The Marquis of Northampton, Pres. R.S.
GRAVES (J. T.) Cato. 8vo. *London* 1844.	The Author.
GRAY (John E.) The Zoology of the Voyage of H.M.S. Erebus and Terror, Part 1, Mammalia. 4to. *London* 1844.	The Editors.
——— The Zoology of the Voyage of H.M.S. Sulphur, under the command of Captain Sir E. Belcher, R.N. (Mammalia.) 4to. *London*.	The Author.
HALL (Marshall.) Memoirs on some Principles of Pathology in the Nervous System.	The Author.
HANSEN (P. A.) Inquiry into the absolute Disturbance in Ellipses of various Eccentricities and Inclinations.	The Author.
HAY (R. D.) Proportion, or the Geometric Principle of Beauty analysed. 4to. *Edinburgh* 1844.	The Author.
HENDERSON (Thomas.) Astronomical Observations made at the Royal Observatory, Edinburgh, for 1839. 4to. *Edinburgh* 1841.	The Author.
HINDS (R. B.) The Regions of Vegetation, being an analysis of the distribution of Vegetable Forms over the surface of the globe. 8vo. *London* 1843.	The Author.
HOGG (John.) Letters from Abroad to a Friend at Cambridge. 8vo. *London* 1844.	The Author.
HOOKER (Sir W.) Notes on the Botany of the Antarctic Voyage; conducted by Captain Sir James Ross, R.N., F.R.S. 4to. *London* 1844.	The Author.
HOPKINS (E.) On the Connexion of Geology with Terrestrial Magnetism. 8vo. *London* 1844.	The Author.
HORANINOW (P.) The Elements of Botany. 8vo. 1841.	The Author.
——— A Treatise on Mineralogy.	———
——— Theoria Sylphidis ejusque Therapiæ Universæ.	———
——— A Treatise on Epidemic Cholera.	———
HULST (F.) Memoir of the Life of René Sluse.	The Author.
JOHNS (J. W.) The Anglican Cathedral Church of Saint James, Mount Zion, Jerusalem. folio. *London* 1844.	The Author.
JOHNSON (M. J.) Astronomical Observations made at the Radcliffe Observatory, Oxford, in 1841. 8vo. *Oxford* 1842.	The Radcliffe Trustees.
JOHNSTON (James.) Elements of Agricultural Chemistry and Geology. 12mo. *Edinburgh* 1844.	The Author.
JONES (T. W.) Report on the present state of Knowledge of the Nature of Inflammation. 8vo. *London* 1844.	The Author.

Presents.	Donors.
JOURNALS.	
Astronomische Nachrichten, Nos. 462 to 492. 4to. *Altona.*	Prof. Schumacher, F.M.R.S.
Athenæum for July 1843 to May 1844. 4to. *London* 1843–44.	The Editor.
British and Foreign Medical Review, Nos. 31, 32, 33. 8vo. *London.*	J. Forbes, Esq., F.R.S.
Electrical Magazine, Nos. 1 to 4. 8vo. *London.*	The Editor.
Journal of the Asiatic Society of Bengal, No. 58, and Nos. 134 to 141. 8vo. *Calcutta.*	The Asiatic Society of Bengal.
London, Edinburgh and Dublin Philosophical Magazine to June 1844. 8vo. *London* 1844.	Richard Taylor, Esq.
London Physiological Journal for October and November 1843 and February 1844.	The Editor.
Monthly Review, January 1844. 8vo. *London.*	The Editor.
Numismatic Chronicle, Nos. 21, 22 and 23. 8vo. *London.*	The Numismatic Society.
Polytechnic Review for April and May. 4to. *London.*	The Editor.
Simmond's Colonial Magazine, No. 1. 8vo. *London.*	The Editor.
Tasmanian Journal, Nos. 6 and 7. 8vo. *Hobarton.*	Sir John Franklin.
The Phytologist, a Botanical Journal, December 1843. 8vo. *London.*	Edward Newman, Esq.
The Zoologist, Nos. 3 to 12. 8vo. *London.*	The Editor.
JUSSIEU (M. de.) Monographie des Malpighiacées, ou exposition des caractères de cette famille de plantes. 4to. *Paris* 1844.	The Author.
KERIGAN (Thos.) A Practical Treatise on the Eclipses of the Sun and Moon. 8vo. *London* 1844.	The Author.
——— The Complete Mathematical and General Navigation Tables, 2 vols. *London* 1838.	———
KOPS (J.) et MIGUEL (F. A. W.) Flora Batava. *Amsterdam.*	H.M. the King of Holland.
KREIL (Karl.) Magnetic and Meteorological Observations at Prague from 1st August 1841 to the 31st July 1842. 4to. *Prague* 1844.	The Author.
LAMONT (J.) Results of Magnetic Observations made at Munich during 1840, 1841, 1842. 4to. *Münich* 1841.	The Author.
LAWSON (Henry.) On the Arrangement of an Observatory. 8vo. *Bath* 1844.	The Author.
LITTROW (C. L. Edlen von.) Annals of the Observatory at Vienna, 1843. 4to. *Vienna* 1844.	The Author.
MÄDLER (J. H.) Astronomical Observations made at the Royal Observatory, Dorpat, from October 1840 to the end of 1841.	The Author.
MAITLAND (Rev. S. R.) A List of the Early Printed Books in the Archiepiscopal Library at Lambeth. 8vo. *London* 1843.	The Archbishop of Canterbury.
MANTELL (G. A.) The Medals of Creation, or First Lessons in Geology. 2 vols. 8vo. *London* 1844.	The Author.
MAPS AND CHARTS.	
Ordnance Sheet Maps, Nos. 88 and 89.	The Ordnance.
The Charts published by the Admiralty in 1843.	The Lords Commissioners of the Admiralty.
MOIVRE (A. de.) Annuities on Lives. 8vo. *London* 1743.	Sir J. W. Lubbock, Bart.
MOORE (George.) An Essay on those Powers of the Mind which have reference to Architectural Study and Design. 4to. *London* 1844.	The Author.
MÜHRY (E.) Stephen's Code of English Law, translated into German. 2 vols. 8vo. *Göttingen* 1843.	The Translator.
MÜLLER (J.) On the Structure of the Pentacrinus Caput Medusæ. fol. *Berlin* 1843.	The Author.

Presents.	Donors.
NAMIAS (Signor.) On certain Effects of Electricity upon the Diseases of Mankind.	The Author.
NEWPORT (George.) An Address delivered at the Anniversary Meeting of the Entomological Society of London, on the 22nd of January 1844. 8vo. *London* 1844.	The Entomological Society.
PADULA (F.) Memoria su i Solidi Caricati verticalmente, e su i Solidi di Ugual Resistenza. 4to. *Naples* 1837.	The Author.
——— Raccolta di Probleme di Geometria. 4to. *Naples* 1838.	———
PALMA (J.) Mémoire sur la Découverte de la Loi du Choc directe des Corps durs.	The Author.
PEREIRA (Jonathan.) A Treatise on Food and Diet. 8vo. *London* 1843.	The Author.
PETERS (A. F.) Numerus Constans Nutationis ex Ascensionibus Rectis Stellæ Polaris in Specula Dorpatensi, anno 1822 ad 1838.	The Author.
PHILLIPS (John.) Memoirs of William Smith, LL.D. 8vo. *London* 1844.	The Author.
PLANTAMOUR (E.) Observations Astronomiques faites à l'Observatoire de Genève, dans 1842.	The Author.
PULLEN (Joseph.) Lecture read on the opening of Gresham College, Nov. 2, 1843. 8vo. *London* 1844.	The Author.
QUAIN (Richard.) The Anatomy of the Arteries of the Human Body, in lithographic drawings, with practical commentaries. Large folio. *London*.	Thomas Graham, Esq.
QUETELET (A.) Annuaire de l'Observatoire Royale de Bruxelles, 1843. 12mo. *Bruxelles* 1843.	The Author.
——— Observations des Phénomènes Périodiques. 4to. *Bruxelles* 1844.	———
——— Résumé des Observations Magnétiques et Météorologiques, 1842. 4to. *Bruxelles* 1842.	———
——— sur l'Emploi de la Boussole dans les Mines. 8vo. *Bruxelles* 1843.	———
REDFIELD (W. C.) Whirlwinds excited by Fire, with further notices of the Tyfoons of the China Sea. *New York*.	The Author.
RIDDELL (Lieut.) Magnetical Instructions for the Use of Portable Instruments. 8vo. *London* 1844.	The Author.
RIGG (Robert.) Experimental Researches, Chemical and Agricultural, showing Carbon to be a compound body made by plants, and decomposed by putrefaction. 8vo. *London* 1844.	The Author.
RONALDS (F.) and BLAIR (Alexander.) Sketches at Carnac in 1834, or Notes concerning the present state of some reputed Celtic Antiquities in that and the adjoining Communes, with a Postscript containing an account of the Great Roche aux Fées or Essé, &c. 4to. *London* 1836.	Francis Ronalds, Esq., F.R.S.
SABBATINI (M.) Della Verità e della Leggé.	The Author.
SCUDAMORE (Sir C.) A Medical Visit to Gräfenberg in 1843, for the purpose of investigating the merits of the Water Cure Treatment. 8vo. *London* 1843.	The Author.
SHAW (A.) An Account of Sir Charles Bell's Classification of the Nervous System. 8vo. *London* 1844.	The Author.
SMITH (W.) Dictionary of Greek and Roman Biography and Mythology, Parts 3, 4, 5. 8vo. *London* 1844.	The Editor.
SOLLY (Edward.) Experiments on the Inorganic Constituents of Plants. 4to. *London* 1844.	The Author.

Presents.	Donors.
SPRY (H.) Suggestions for the Improvement of the Agricultural and Commercial Resources of India. 8vo. *Calcutta* 1841.	The Directors of the East India Company.
STRUVE (M. W.) Table des Positions Géographiques principales de la Russie.	The Author.
——— Sur le Coefficient Constant dans l'Aberration des Étoiles Fixes.	———
TAYLOR (John.) Poems. 8vo. *London*.	The Author.
THORNTON (Edward.) The History of the British Empire in India. Vol. V. 8vo. *London* 1844.	Messrs. W. H. Allen and Co.
TOYNBEE (Joseph.) Second Series of Observations on the Pathology of the Ear. 8vo. *London* 1844.	The Author.
TRAVERS (Benjamin.) The Physiology of Inflammation and the Healing Process. 8vo. *London* 1844.	The Author.
VENTURUCCI (Dottor G.) Sulla Rabbia communicata. 8vo. *Firenze* 1843.	The Author.
VETCH (Capt.) Inquiry into the Means of establishing a Ship Navigation between the Mediterranean and the Red Sea. 8vo. *London* 1843.	The Author.
VIREY (J.) De la Physiologie dans ses Rapports avec la Philosophie. 8vo. *Paris* 1834.	The Author.
WALDHEIM (G. F. de.) Revue des Fossiles du Gouvernement de Moscou.	The Author.
WARTMANN (E.) Mémoire sur le Daltonisme. 4to. *Paris* 1844.	The Author.
WEBSTER (John.) Observations on the Admission of Medical Pupils to the Wards of Bethlem Hospital, for the purpose of studying Mental Diseases. 8vo. *London* 1842.	The Author.
WEDDLE (Thomas.) A New Simple and General Method of solving Numerical Equations of all Orders. 4to. *London* 1842.	The Author.
WELD (C. R.) The Statistical Companion to the Pocket Book, corrected to May 1844. 18mo. *London*.	The Author.
WERGELAND (H.) On the Impediments to Agricultural Improvements in Norway, and the Remedies proposed.	The Author.
WILSON (John.) The Parsi Religion as contained in the Zand Avastá. 8vo. *Bombay* 1843.	The Author.
WILLICH (C. M.) Annual Supplement to Tithe Commutation Tables, 1844. 8vo. *London*.	The Author.
YOUNG (J. R.) Researches on the Imaginary Roots of Equations. 8vo. *London* 1844.	The Author.

FRANKLIN INSTITUTE LIBRARY

THE ROYAL SOCIETY.

30th November, 1844.

THE ROYAL SOCIETY. Nov. 30, 1844.

Her Sacred Majesty QUEEN VICTORIA, Patron.

Date of Election.	
1840. Apr. 30.	HIS ROYAL HIGHNESS, PRINCE ALBERT OF SAXE-COBURG AND GOTHA.
1828. Apr. 24.	HIS ROYAL HIGHNESS, ERNEST AUGUSTUS, DUKE OF CUMBERLAND, KING OF HANOVER.
1817. May 22.	HIS IMPERIAL MAJESTY NICHOLAS, EMPEROR OF ALL THE RUSSIAS.
1842. Jan. 20.	HIS MAJESTY FREDERICK WILLIAM IV., KING OF PRUSSIA.
1816. ———	HIS MAJESTY LEOPOLD, KING OF THE BELGIANS.
1822. June 6.	HIS MAJESTY CHRISTIAN VIII., KING OF DENMARK, D.C.L.
1844. June 13.	HIS MAJESTY FREDERICK, KING OF SAXONY.
1826. Dec. 21.	HIS MAJESTY OSCAR I., KING OF SWEDEN AND NORWAY.
1838. May 24.	HIS IMPERIAL AND ROYAL HIGHNESS, LEOPOLD THE SECOND, GRAND DUKE OF TUSCANY.
1816. Feb. 8.	HIS IMPERIAL HIGHNESS, THE ARCHDUKE JOHN OF AUSTRIA.
1816. Feb. 8.	HIS IMPERIAL HIGHNESS, THE ARCHDUKE LOUIS OF AUSTRIA.
1802. Mar. 4.	HIS IMPERIAL HIGHNESS, THE ARCHDUKE MAXIMILIAN OF AUSTRIA.

THE COUNCIL

OF

THE ROYAL SOCIETY.

THE MARQUIS OF NORTHAMPTON.—PRESIDENT.

SIR J.W.LUBBOCK, BART., M.A., V.P. AND TREAS.	VERY REV. DEAN OF ELY, V.P.
PETER MARK ROGET, M.D.—SECRETARY.	THOMAS GRAHAM, ESQ., M.A.
S.HUNTER CHRISTIE, ESQ., M.A.—SECRETARY.	RODERICK IMPEY MURCHISON, ESQ., V.P.
JOHN F. DANIELL, ESQ., D.C.L., FOR. SEC.	RICHARD OWEN, ESQ.
JOHN BOSTOCK, M.D.	SIR JAMES CLARK ROSS, CAPT. R.N., V.P.
WILLIAM BOWMAN, ESQ.	JOHN FORBES ROYLE, M.D.
ISAMBARD KINGDOM BRUNEL, ESQ.	WILLIAM SHARPEY, M.D.
REV. WILLIAM BUCKLAND, D.D., V.P.	JOHN TAYLOR, ESQ.
SIR WILLIAM BURNETT, M.D., K.C.H.	REV. ROBERT WALKER, M.A.
GEORGE DOLLOND, ESQ.	LORD WROTTESLEY, V.P.

*** *This Council will continue till November* 30, 1845.

Omissions having occasionally occurred in the Annual List of Deceased Fellows, as announced from the Chair at the Anniversary Meeting of the Royal Society, any information on that subject, as also Notice of Changes of Residence, will be received by the Assistant Secretary, Charles Richard Weld, Esq.

SCIENTIFIC COMMITTEES OF THE ROYAL SOCIETY.

FOR THE SESSION OF 1844–1845.

1. MATHEMATICS.

MR. AIRY.
MR. BABBAGE.
MR. CHRISTIE.
The Very Rev. The DEAN OF ELY.
MR. GALLOWAY.
MR. GOMPERTZ.
MR. GRAVES.
SIR J. F. W. HERSCHEL, BART.
MR. HOPKINS.
REV. P. KELLAND.
REV. H. LLOYD.
SIR J. W. LUBBOCK, BART.
MR. MACCULLAGH.
MR. H. FOX TALBOT.
REV. W. WHEWELL.

2. ASTRONOMY.

MR. AIRY.
SIR THOMAS BRISBANE.
REV. G. FISHER.
MR. DOLLOND.
The Very Rev. The DEAN OF ELY.
MR. GALLOWAY.
SIR J. F. W. HERSCHEL, BART.
SIR J. W. LUBBOCK, BART.
REV. W. PEARSON.
THE EARL OF ROSSE.
REV. R. SHEEPSHANKS.
CAPT. SMYTH, R.N.
LIEUT. STRATFORD, R.N.
LORD WROTTESLEY.

3. PHYSICS, INCLUDING METEOROLOGY.

MR. AIRY.
MR. BARLOW.
CAPT. BEAUFORT, R.N.
SIR DAVID BREWSTER.
MR. CHRISTIE.
COLONEL COLBY.
MR. DANIELL.
The Very Rev. The DEAN OF ELY.
MR. FARADAY.
MR. J. D. FORBES.
MR. SNOW HARRIS.
SIR J. F. W. HERSCHEL, BART.
MR. HOPKINS.
MR. LUKE HOWARD.
REV. P. KELLAND.
REV. H. LLOYD.
MR. J. MACCULLAGH.
MR. MILLER.
MR. JOHN PHILLIPS.
REV. B. POWELL.
SIR J. C. ROSS, CAPT. R.N.
LIEUT.-COL. SYKES.
MR. H. FOX TALBOT.
REV. W. WHEWELL.
REV. R. WILLIS.

4. CHEMISTRY.

MR. BRANDE.
MR. CHILDREN.
MR. CUMMING.
MR. DANIELL.
DR. DAUBENY.
MR. FARADAY.
MR. GRAHAM.
MR. HATCHETT.
MR. JOHNSTON.
MR. PEPYS.
MR. RICHARD PHILLIPS.
DR. PROUT.
DR. THOMAS THOMSON.

5. MINERALOGY AND GEOLOGY.

MR. H. J. BROOKE.
REV. W. BUCKLAND.
MR. C. DARWIN.
SIR H. T. DE LA BECHE.
DR. FITTON.
MR. GREENOUGH.
MR. HORNER.
MR. JAMESON.
MR. LYELL.
DR. MANTELL.
MR. MILLER.
MR. MURCHISON.
MR. JOHN PHILLIPS.
REV. A. SEDGWICK.
MR. TAYLOR.

6. BOTANY AND VEGETABLE PHYSIOLOGY.

DR. DAUBENY.
MR. DILLWYN.
MR. FORSTER.
SIR W. J. HOOKER, K.H.
DR. HORSFIELD.
MR. KONIG.
DR. LINDLEY.
DR. PEREIRA.
DR. ROYLE.
MR. RUDGE.
MR. R. H. SOLLY.
MR. STOKES.
MR. H. FOX TALBOT.
MR. DAWSON TURNER.
DR. WALLICH.

7. ZOOLOGY AND ANIMAL PHYSIOLOGY.

DR. MARTIN BARRY.
MR. THOMAS BELL.
DR. BOSTOCK.
MR. BOWMAN.
SIR B. C. BRODIE, BART.
MR. CLIFT.
MR. J. E. GRAY.
MR. GREEN.
MR. KIERNAN.
MR. LAWRENCE.
MR. OWEN.
DR. PRICHARD.
DR. ROGET.
DR. SHARPEY.
DR. TODD.

By a Resolution of the Council (April 11th, 1839), the President, Treasurer, and Secretaries are, *ex officio*, Members of all Committees.

FELLOWS OF THE SOCIETY.

NOVEMBER 30, 1844.

(*) prefixed to a name indicates that the Member is liable to an annual payment of £2 12s.
(†) prefixed to a name indicates that the Member is liable to an annual payment of £4.

Date of Election.	
1808. Apr. 28.	Aberdeen, George, Earl of, K.T. Trust. Brit. Mus.—President of the Society of Antiquaries, F.L.S. *Argyll-house.*
1839. June 20.	Acland, Sir Thomas Dyke, Bart., F.G.S. *Killerton-park, Devon.*
1834. Apr. 10.	Adare, Edwin, Viscount, F.R.A.S. *Adare-abbey, Limerick; Dunraven-castle, Glamorganshire.*
1832. June 7.	† Agar, Hon. George Charles, M.A. *University Club.*
1819. Feb. 18.	Ailsa, Archibald, Marquis of, K.T. *Whitehall-gardens; and Culzean-castle, Ayrshire.*
1836. Jan. 21.	Airy, George Biddell, Esq., M.A., D.C.L., Astronomer Royal. V.P.R.A.S.—Hon. Mem. R.S.E. R.I.A. R.I.S.W. F.C.P.S., Corresp. Mem. National Inst. Washington U.S. Inst. Reg. Sc. Paris., Acadd. Imp. Sc. Petrop., et Reg. Sc. Berol. Corresp., Acadd. Sc. Lit. Panorm., Holm. et Monach. Socc. Reg., Sc. Hafn., Acad. Amer. Art. et Sc. Bost. Socius. *The Royal Observatory, Greenwich.*
1841. June 17.	† Alderson, James, M.D. Coll. Reg. Med. Socius. *Kingston-upon-Hull.*
1844. Apr. 18.	Allen, William, Esq., Capt. R.N.
1824. Jan. 22.	Amyot, Thomas, Esq. Treas. S.A. Hon. M.R.I.A. Soc. Reg. Antiq. Septen. Hafn. Socius. 13 *James-street, Westminster.*
1811. May 23.	Anderdon, John Proctor, Esq.
1821. Mar. 29.	Andrew, James, LL.D.
1840. Jan. 30.	† Annesley, Sir James. *H 6, Albany.*
1834. Apr. 10.	Ansell, Charles, Esq., F.S.A. *Tottenham.*
1844. Jan. 11.	† Ansted, David Thomas, Esq., M.A., Professor of Geology, King's College, London. *Jesus College, Cambridge.*
1840. Nov. 26.	† Archibald, Charles Dickson, Esq, F.S.A. F.G.S. M.R.I. 3 *York-terrace, Regent's-park; and Rutland-hall, Lancashire.*
1819. May 20.	Argyll, John Douglas Edward Henry Campbell, Duke of, F.R.S.E. 3 *Connaught-place West; and Inverary-castle, Argyllshire.*
1843. May 25.	† Arnott, James Moncrieff, Esq. 2 *New Burlington-street.*
1838. Jan. 25.	† Arnott, Neil, M.D. 38 *Bedford-square.*
1841. Feb. 4.	† Atcherley, David Francis, Esq. 52 *Bedford square; and Marton, near Shrewsbury.*
1830. Mar. 18.	Audubon, John James, Esq., F.L.S.
1840. May. 7.	† Auldjo, John, Esq. *Nocl-house, Kensington.*
1837. June 1.	† Ayrton, William, Esq., F.S.A. 39 *Dorset-square, New-road.*
1816. Mar. 14.	Babbage, Charles, Esq., M.A. F.R.S.E. Hon. M.R.I.A. F.R.A.S. M.C.P.S. Inst. Reg. Sc. Paris. Corresp. Acadd. Reg. Sc. Masil., Hafn., et Divion. ex intim.: Acad. Amer. Art. et Sc. Bost., Socc. Reg. Œcon. Boruss., et Phys. Hist. Nat. Genev., Socius.—Acadd. Imp. et Reg. Petrop. Pat., Georg. Florent., Brux., Neap., Mut., Lync. Rom., Corresp., Societ. Philomat. Paris. 1 *Dorset-street, Manchester-square.*

Date of Election.		
1816. May 23.	*	Baber, Rev. Henry Hervey, M.A. M.R.S.L. Acad. Reg. Sc. Monach. Socius. *Stretham, Cambridgeshire.*
1828. Mar. 13.		Babington, Benjamin Guy, M.D. Coll. Reg. Med. Socius. 31 *George-street, Hanover-sq.*
1836. Feb. 11.	†	Baillie, David, Esq. 14 *Belgrave-square.*
1842. Jan. 13.	†	Baily, Edward Hodges, Esq., R.A. 10 *Percy-street, Tottenham-court-road.*
1841. June 10.	†	Baring, Sir Thomas, Bart. 21 *Devonshire-place; and Stratton-park, Winchester.*
1839. June 6.	†	Barker, George, Esq. *Birmingham.*
1834. Dec. 18.		Barlow, Rev. John, M.A. F.L.S. Sec. R.I. 12 *Henrietta-street, Cavendish-square.*
1823. May 29.		Barlow, Peter, Esq., F.R.A.S. Hon. M.C.P.S. Acadd. Imp. Sc. Petrop. Amer. Art. et Sc. Bost. Socius.—Instit. Reg. Sc. Paris., et Acad. Reg. Sc. Brux. Corresp. *Royal Military Academy, Woolwich.*
1809. Mar. 9.		Barnwell, Charles Frederick, Esq., M.A. F.S.A. 44 *Woburn-place, Russell-square.*
1823. Feb. 13.		Baron, John, M.D. *Cheltenham.*
1805. July 4.		Barrow, Sir John, Bart., F.L.S. 21 *New-street, Spring-gardens.*
1840. Feb. 13.	†	Barry, Martin, M.D. F.R.S.E Coll. Reg. Med. Edin. Socius. *Edinburgh.*
1843. May 11.	†	Basevi, George, Esq., F.S.A. 17 *Saville-row.*
1838. Feb. 8.	†	Bateman, James, Esq., F.L.S. *Knypersley-hall, Staffordshire.*
1814. Feb. 14.	*	Bath and Wells, George Henry Law, Lord Bishop of, F.S.A. F.L.S. *Wells, Somersetshire.*
1822. Feb. 28.		Batty, Lieut.-Colonel Robert. 1 *Ridgmount-place, Ampthill-square.*
1828. Feb. 21.	†	Baylay, Rev. William Frederick, M.A. F.S.A. *Canterbury.*
1827. Nov. 15.		Beamish, Major North Ludlow, K.H. *Windham Club, St. James's-square.*
1836. Mar. 24.		Beamish, Richard, Esq. *Sans Souci, Prestbury, Cheltenham.*
1809. Dec. 7.		Beauclerk, Vice-Admiral Lord, Amelius, K.C.B. G.C.H. *Plymouth.*
1814. June 30.		Beaufort, Francis, Esq., Capt. R.N., F.G.S. F.R.A.S. Instit. Sc. Paris. Corresp. *Admiralty; and* 11 *Gloucester-place, Portman-square.*
1815. Dec. 14.		Beaufoy, Henry, Esq., F.L.S. *South Lambeth.*
1835. June 4.	†	Beaumont, Edward Blackett, Esq., F.R.A.S. *Finningly-park, near Bawtry, Yorkshire.*
1816. Mar. 14.		Beckett, Right Hon. Sir John, Bart., LL.D. 11 *Stratford-place; and Somerby-park, Gainsborough.*
1824. Dec. 23.	†	Beechey, Frederick William, Esq., Capt. R.N., F.R.A.S. *Worthing.*
1835. Feb. 5.	†	Beetham, Albert William, Esq., F.S.A. 3 *Sergeant's-inn, Fleet-street; and Ropehill-lodge, Bolder, near Lymington, Hants.*
1828. Jan. 10.		Bell, Thomas, Esq., F.L.S. F.G.S. Socc. Hist. Nat. et Philomath. Paris, Acad. Sc. Philad. et Soc. Hist. Nat. Bost. Corresp. Prof. of Zoology, King's College, London. 17 *New Broad-street; and Hornsey, Middlesex.*
1834. Dec. 18.	†	Bellamy, Rev. James William, B.D. *Merchant Tailor's School, Suffolk-lane.*
1841. Dec. 16.	†	Bennett, John Joseph, Esq., Sec. L.S. *British Museum.*
1831. May 5.		Beverly, Charles James, Esq., F.L.S. 1 *Hackney-grove, Hackney.*
1822. Feb. 7.		Bexley, Nicholas Lord, M.A. F.S.A. M.R.S.L. 31 *Great George-street; and Foot's-Cray-place, Kent.*
1827. May 10.		Bicheno, James Ebenezer, Esq., F.L.S. F.G.S. Colonial Secretary, Van Diemen's Land. *Hobart Town.*
1821. Mar. 8.		Bicknell, John Laurens, Esq. 25 *Abingdon-street.*
1837. June 8.	†	Bigsby, Robert Grymbald, Esq., F.S.A. *Repton, near Burton-on-Trent, Staffordshire.*

Date of Election.	
1844. June 6.	† Billing, Archibald, M.D. Coll. Reg. Med. Socius. Soc. Med. Nov-Ebor. Socius, Socc. Med.-Phys. Florent. et Med.-Chir. Brux. Corresp. 6 *Grosvenor Gate, Park-lane.*
1809. June 22.	Bingley, Robert, Esq., F.G.S. *Royal Mint, Tower-hill; and Woodford, Essex.*
1844. May 9.	† Bishop, John, Esq. 38 *Bernard-street, Russell-square.*
1830. Mar. 4.	Blake, Capt. Benjamin, F.G.S. F.R.A.S. *India.*
1843. Apr. 6.	Blake, Henry Wollaston, Esq. *Soho, Birmingham; and* 62 *Portland-place.*
1807. May 14.	Blake, William, Esq., M.A. F.G.S. 62 *Portland-place; and Danesbury, near Welwyn, Hertfordshire.*
1831. Jan. 20.	Blake, William John, Esq. 62 *Portland-place.*
1841. Jan. 21.	† Blakiston, Peyton, M.D. Coll. Reg. Med. Socius. *Birmingham.*
1816. Feb. 8.	Bland, Michael, Esq. F.S.A. F.G.S. *St. Leonard's, Hastings.*
1821. Apr. 12.	Bland, Rev. Miles, D.D. F.S.A. F.R.A.S. M.R.S.L. *Lilley Rectory, near Luton.*
1841. June 10.	† Blore, Edward, Esq. 4 *Manchester-square.*
1837. May 11.	Boase, Henry, M.D. F.G.S. *Claverhouse, near Dundee.*
1840. Mar. 5.	† Boileau, John Theophilus, Esq. Major E.I.C.S. *India.*
1843. June 1.	Boileau, Sir John, Bart. 20 *Upper Brook-street; and Ketteringham Hall, Norfolk.*
1840. June 18.	† Bonner, Col. John George, E.I.C.S. 11 *A, Great Cumberland-street, Hyde-park.*
1834. Apr. 10.	† Booth, Sir Felix, Bart. 43 *Portland-place; and Hendon, Middlesex.*
1835. June 4.	† Borrer, William, Esq., F.L.S. *Henfield, Sussex.*
1793. June 6.	Bosanquet, Samuel, Esq. 73 *Lombard-street.*
1818. Apr. 2.	Bostock, John, M.D. F.L.S. F.G.S. F.R.A.S. 22 *Upper Bedford-place.*
1829. June 4.	Bosworth, Rev. Joseph, LL.D. F.S.A. M.R.S.L. Soc. Reg. Antiq. Septen. Hafn. Corresp. Socc. Reg. Sc. Norv., Dronth., et Gotho. Socius. 9 *Southampton-street, Bloomsbury; and Etwell, Uttoxeter, Staffordshire.*
1839. Jan. 17.	Botfield, Beriah, Esq., M.P. F.S.A. F.R.A.S. F.G.S. F.L.S. *Norton-hall, Northamptonshire.*
1814. May 5.	Boughton, Sir William Edward Rouse, Bart. *Downton-hall, Ludlow.*
1826. Apr. 20.	Bourne, Right Hon. William Sturges, M.A. 32 *Upper Brook-street; and Testwood-house, Southampton.*
1842. Nov. 17.	Bowerbank, James Scott, Esq., F.G.S. 45 *Park-street, Islington.*
1841. Apr. 22.	Bowman, William, Esq. 14 *Golden-square.*
1814. June 23.	Boyle, Hon. Sir Courtenay, Knt. 24 *Upper Berkeley-street; and Hampton-court Palace.*
1809. Apr. 13.	Brande, William Thomas, Esq., Professor of Chemistry in the Royal Institution. F.R.S.E. *Royal Mint, Tower-hill.*
1821. Mar. 8.	Brandreth, Thomas Shaw, Esq. *University-club.*
1841. Jan. 21.	† Brandreth, Henry Rowland, Esq., Capt. R.E. *Somerset-house.*
1834. June 5.	† Breadalbane, John Campbell, Marquis of. 21 *Park-lane; and Taymouth-castle, Aberfeldie.*
1815. May 4.	Brewster, Sir David, K.H. LL.D. F.R.S.E. Hon. M.R.I.A. F.G.S. F.R.A.S. Instit. Reg. Sc. Paris. Corresp.—Soc. Reg. Sc. Gotting. Socius. Principal of St. Leonard's College. *St. Andrew's.*
1821. Mar. 15.	Bridgman, William, Esq., F.S.A. F.L.S. *Frogmore, Gloucester.*
1838. Nov. 22.	† Briggs, Major-General John, E.I.C.S. M.R.A.S. F.G.S. 2 *St. James's-square, Cheltenham.*
1821. Mar. 8.	Bright, Richard, M.D. Coll. Reg. Med. Socius, F.G.S. Soc. Reg. Med. Hafn. Socius.—Acad. Sc. Sien., Socc. Erud. Hung., et Medico-Chir. Berolin. Corresp. 11 *Saville-row.*

Date of Election.		
1810. May 10.		Brisbane, Lieut.-General Sir Thomas Macdougall, K.C.B. G.C.H. D.C.L. President of the Royal Society of Edinburgh, Hon. M.R.I.A. F.R.A.S. F.L.S. Instit. Reg. Sc. Paris. Corresp. *Makerstown, Kelso.*
1805. May 23.		Bristol, Frederick William, Marquis of. 6 *St. James's-square; and Ickworth-park, Bury St. Edmunds.*
1834. Dec. 18.	†	Brockedon, William, Esq. 29 *Devonshire-street, Queen's-square.*
1828. Feb. 14.		Broderip, William John, Esq. B.A. F.L.S. F.G.S. 2 *Raymond's-buildings, Gray's-inn.*
1810. Feb. 15.	*	Brodie, Sir Benjamin Collins, Bart. Serjeant Surgeon to the Queen. 14 *Saville-row.*
1817. Mar. 13.		Bromhead, Sir Edward Ffrench, Bart. M.A. F.R.S.E. F.R.A.S. *Thurlby, Lincolnshire.*
1823. May 29.		Brooke, Sir Arthur Brooke de Capell, Bart. M.A. F.L.S. F.G.S. *Okeley, Northamptonshire.*
1819. Apr. 22.		Brooke, Henry James, Esq. F.L.S. F.G.S. *Clapham-rise.*
1803. Mar. 3.		Brougham and Vaux, Henry, Lord, M.A. Instit. Reg. Sc. Paris. Socius. 4 *Grafton-street; and Brougham-hall, Penrith.*
1842. Feb. 17.	†	Broughton, Robert Edwards, Esq. 1 *Melcombe-place.*
1811. Dec. 12.		Brown, Robert, Esq., D.C.L. Hon. Mem. R.S.E., R.I.A., Med.-Chirurg. S., and C.P.S. V.P.L.S. Instit. Reg. (Acad. Scient.) Paris. Socius.—Acadd. Imp. Sc. Petrop., et Cæs. Nat. Cur., Reg. Sc. Berol., Holm., Monach., Neap., Bruxell. et Bonon., Socc. Reg. Sc. Hafn. et Upsal., Instit. Reg. Sc. Amstelod., Socc. Sc. Harlem., Trajectin., Phys. et Hist. Nat. Genev., Imp. Hist. Nat. Mosc., Nat. Scrutat. Berolin., Wetter., Phil. Nov.-Ebor., et Med. Holm. Socius. 17 *Dean-street, Soho-square.*
1838. May 8.		Brownlow, John, Earl, D.C.L. F.S.A. F.L.S. F.G.S. M.R.A.S. 12 *Belgrave-square; and Belton-house, Grantham.*
1829. Mar. 18.		Bruce, Right Hon. Sir James Lewis Knight, Knt. F.S.A. Vice-Chancellor. *Roehampton Priory.*
1830. June 10.		Brunel, Isambard Kingdom, Esq. 18 *Duke-street, Westminster.*
1814. Mar. 24.		Brunel, Sir Mark Isambard, Knt. Instit. Reg. Sc. Paris., et Acad. Reg. Sc. Monach., Corresp. *Thames Tunnel.*
1833. June 20.		Buccleuch, Walter Francis, Duke of, K.T. D.C.L. F.L.S. *Whitehall-gardens; and Dalkeith-house, Edinburgh.*
1818. Feb. 26.		Buckland, Rev. William, D.D., Professor of Mineralogy and Geology, Oxford. F.L.S. F.G.S. Instit. Reg. Sc. Paris. Corresp., Acad. Sc. Bonon. Socc. Min. Imp. Petrop. et Cæs. Nat. Cur. Mosc., Socius. *Christ-church, Oxford.*
1836. Jan. 21.	†	Budd, George, M.D. Coll. Reg. Med. Socius. 20 *Dover-street, Piccadilly; and Caius-college, Cambridge.*
1840. May 21.	†	Burge, William, Esq. 1 *Paper-buildings, Temple.*
1829. Dec. 10.		Burlington, William, Earl of, M.A. Chancellor of the University of London.—F.G.S. 10 *Belgrave-square; and Hardwick-hall, Derbyshire.*
1835. April 2.		Burnes, James, K.H. D.C.L. *India.*
1837. Mar. 16.	†	Burnet, John, Esq. 2 *Whiteheads Grove, Chelsea.*
1838. May 3.	†	Burnet, Rev. Thomas, D.D., Rector of St. James, Garlickhythe.
1833. Apr. 18.	†	Burnett, Sir William, K.C.H. M.D. Coll. Reg. Med. Socius.—Acad. Med. et Chir. Petrop. Socius Honor. 5 *Somerset-place.*
1814. Dec. 22.		Burney, Rev. Charles Parr, D.D. F.S.A. F.L.S. F.G.S. F.R.A.S. M.R.A.S. M.R.S.L. *Rectory-house, Sible Hedingham, near Halsted, Essex.*
1829. April 1.		Burns, John, M.D. *Glasgow.*

Date of Election.	
1818. Feb. 26.	Burrow, Rev. Edward John, D.D. F.G.S. *Gibraltar.*
1836. Mar. 17.	Burt, Major T. Seymour, M.R.A.S. *India.*
1832. Dec. 6.	Burton, Decimus, Esq., F.S.A. 6 *Spring-gardens; and St. Leonard's, Hastings.*
1836. May 5.	† Burton, Edward, Esq., F.L.S. *Brooklyn, near Maidstone.*
1844. Feb. 1.	† Bury, Edward, Esq. Superintendent of the Locomotive Power of the London and Birmingham Railway Company. *Wolverton.*
1818. Jan. 8.	Bute, John, Marquis of, D.C.L. F.S.A. F.R.A.S. *Camden-hill, Kensington; and Cardiff Castle, Glamorganshire.*
1819. May 20.	Butler, The Very Rev. George, D.D. Dean of Peterborough, F.S.A. F.R.A.S.
1822. Mar. 21.	Butter, John, M.D. F.L.S. *Plymouth; and Corringdon-hall, South Brent, Devonshire.*
1841. May 6.	† Byng, Right Hon. George Stevens. 77 *Eaton-square.*
1837. Jan. 19.	Cabbell, Benjamin Bond, Esq., F.S.A. 1 *Brick-court, Temple.*
1810. June 28.	Cadell, William Archibald, Esq., F.R.S.E. F.G.S. *Edinburgh.*
1831. Mar. 10.	Caldcleugh, Alexander, Esq., F.L.S. F.G.S. *Chili.*
1840. Feb. 20.	Caldecott, John, Esq., F.R.A.S. *Observatory, Travancore, India.*
1796. Nov. 17.	Canterbury, Right Hon. William Howley, D.D., Lord Archbishop of, Trust. Brit. Mus. F.S.A. M.R.S.L. *Lambeth-palace.*
1839. Feb. 14.	† Carington, Robert John, Lord, *Whitehall-yard; and Wycombe-abbey and Gayhurst, Bucks.*
1826. Feb. 9.	Carleton, Hon. and Rev. Richard, M.A. *Greywell-hill, Odiham, Hampshire.*
1814. May 19.	Carlisle, Nicholas, Esq., K.H. D.C.L. Hon. M.R.I.A. Sec. A.S. Soc. Reg. Antiq. Septen. Hafn., et Acad. Reg. Sc. Holm. Socius, Acad. Sc. et Lit. Panorm. Corresp. *Somerset-house.*
1838. May 3.	† Carnac, Sir James Rivett, Bart.
1818. May 28.	Carne, Joseph, Esq., M.R.I.A. F.G.S. *Penzance.*
1844. Feb. 1.	† Carpenter, William Benjamin, M.D. *Ripley, Surrey.*
1817. Feb. 13.	* Carpue, Joseph Constantine, Esq. 45 *Upper Charlotte-street, Fitzroy-square.*
1800. Dec. 18.	Carrington, Sir Codrington Edmund, Knt. D.C.L. F.S.A. M.R.A.S. 32 *Russell-square.*
1841. Feb. 11.	Cartwright, Samuel, Esq., F.L.S. 32 *Old Burlington-street.*
1812. June 11.	Cawdor, John Frederick, Earl, Trust. Brit. Mus. F.G.S. 74 *South Audley-street; and Cawdor-castle, Nairn.*
1828. Mar. 13.	Chambers, William Frederick, M.D. K.C.H. Physician to the Queen. Coll. Reg. Med. Socius. 46 *Brook-street.*
1833. Feb. 7.	† Chandler, Very Rev. George, Dean of Chichester, D.C.L. M.R.S.L. R.G.S. 36 *Mortimer-street.*
1816. Nov. 21.	Chapman, Colonel Sir Stephen Remnant, C.B. K.C.H. Royal Engineers. *Bermudas.*
1836. Apr. 28.	† Chapman, John James, Esq., Capt. R.A. *Athenæum.*
1842. May 26.	Chapman, Thomas, Esq., F.S.A. 14 *Montagu-place; and Whitby, Yorkshire.*
1834. Feb. 6.	Chesney, Lieut.-Colonel Francis Rawdon, Royal Artillery. 11 *Wilton-terrace, Grosvenor-place.*
1807. Mar. 12.	Children, John George, Esq., F.R.S.E. F.S.A. F.L.S. 48 *Torrington-square.*
1826. Jan. 12.	Christie, Samuel Hunter, Esq., M.A.—SECRETARY.—F.R.A.S. F.C.P.S., Professor of Mathematics, Royal Military Academy. Acad. Sc. et Lit. Panorm., et Soc. Philom. Paris. Corresp. *Royal Military Academy, Woolwich.*
1842. Apr. 14.	† Christmas, Rev. Henry, M.A. F.S.A. *Sion college, London Wall.*
1833. Apr. 18.	Christopher, Robert Adam Dundas, Esq. 97 *Eaton-square.*

Date of Election.	
1818. Dec. 10.	Churchill, Francis Almaric, Lord. *Cornbury-park, near Witney, Oxfordshire.*
1832. June 7.	Clark, Sir James, Bart. M.D. Physician to the Queen. 22 *B, Brook-street.*
1836. Jan. 28.	† Clark, William, M.D. *Cambridge.*
1837. May 11.	† Clark, William Tierney, Esq. *Hammersmith.*
1825. June 9.	Clarke, Sir Charles Mansfield, Bart. M.D., Coll. Reg. Med. Socius. *Wigginton-lodge, Tamworth; and* 14 *New Burlington-street.*
1820. May 18.	Clarke, Loftus Longueville, Esq., M.A. *India.*
1841. Feb. 18.	† Clendinning, John, M.D. Coll. Reg. Med. Socius. 16 *Wimpole-street.*
1819. May 27.	Clerk, Sir George, Bart. D.C.L. M.P. F.R.S.E. F.G.S. 8 *Park street, Westminster.*
1833. Apr. 18.	† Clerke, Major Thomas Henry Shadwell, K.H. R.E. F.R.A.S. 4 *Brompton-grove.*
1823. May 8.	Clift, William, Esq., F.G.S. *Royal College of Surgeons, Lincoln's-inn-fields.*
1820. Dec. 21.	Cockburn, Vice-Admiral Right Hon. Sir George, G.C.B. G.C.H. F.R.A.S.
1829. Feb. 12.	Coddington, Rev. Henry, M.A. F.R.A.S. *Ware, Hertfordshire.*
1822. Nov. 21.	Codrington, Vice-Admiral Sir Edward, G.C.B. *Admiralty-house, Portsmouth; and Hampton-lodge, Brighton.*
1820. Apr. 13.	Colby, Colonel Thomas, R.E. LL.D. F.R.S.E. Hon. M.R.I.A. F.G.S. F.R.A.S. M.R.A.S. *Ordnance Map Office, Tower; and Dépôt Ordnance Survey of Ireland, Dublin.*
1830. Feb. 18.	Collier, Charles, M.D. F.G.S. 20 *Fitzroy-square.*
1830. Jan. 14.	† Colquhoun, Major James Nisbet, Royal Artillery. *Athenæum-club.*
1819. Dec. 9.	Conybeare, Rev. William Daniel, M.A. F.G.S. Instit. Reg. Sc. Paris. Corresp. *Axminster.*
1840. June 4.	† Cook, Thomas, Esq., Lieut. R.N. *Croydon, Surrey.*
1829. June 18.	Cooper, Bransby Blake, Esq. 2 *New-street, Spring-gardens.*
1832. Dec. 6.	Cooper, Charles Purton, Esq., LL.D. Hon. M.R.I.A. 7 *New Boswell-court, Lincoln's-inn.*
1834. Feb. 6.	Copeland, Thomas, Esq. 17 *Cavendish-square.*
1833. Dec. 5.	† Copland, James, M.D. Coll. Reg. Med. Socius. 5 *Burlington-street.*
1821. May 24.	Cotton, William, Esq., F.S.A. 3 *Crosby-square, Bishopsgate-street; and Walwood-house, Leytonstone.*
1836. May 5.	† Cox, William Sands, Esq. *Birmingham.*
1812. Apr. 16.	Crampton, Sir Philip Cecil, Bart. D.C.L. *Dublin.*
1818. May 7.	Crawford, John, Esq., F.L.S. F.G.S. M.R.A.S.
1842. Dec. 22.	Creuze, Augustin F. B., Esq. *Portsmouth.*
1800. May 8.	* Crichton, Sir Alexander, Knt. M.D. Grand Cross of St. Ann and St. Vladimir, F.L.S. F.G.S. Acad. Imp. Sc. Petrop., et Soc. Imp. Hist. Nat. Mosc., Socius.—Soc. Reg. Sc. Gotting. Corresp. *Seal Chart, near Sevenoaks, Kent.*
1818. Mar. 5.	Croft, Sir John, Bart. K.T.S. D.C.L. Acad. Reg. Olyssip. Socius. *Milgate, near Maidstone.*
1810. July 5.	Croker, Right Hon. John Wilson, LL.D. 6 *Park-street, Westminster.*
1836. Feb. 18.	† Crosse, John Green, M.D. Acad. Reg. Med. Paris., Soc. Reg. Med. Hafn. Med. Chir. Berolin., Soc. Amer. Philad. Socius. *Norwich.*
1843. Dec. 7.	† Crozier, Francis Rawdon Moira, Esq. Capt. R N.
1844. Feb. 29.	Crum, Walter, Esq. *Thomlie Bank, near Glasgow.*
1830. Apr. 1.	Cubitt, William, Esq. M.R.I.A. F.R.A.S. 6 *Great George-street, Westminster.*
1807. Jan. 22.	Cuming, Lieut.-General Hon. John Leslie.
1816. Jan. 11.	Cumming, Rev. James, M.A., Professor of Chemistry, Cambridge, F.G. *Cambridge.*

Date of Election.		
1838. Jan. 25.	†	Cureton, Rev. William, M.A. 37 *Queen Anne-street; and British Museum.*
1841. May 27.		Cursetjee, Ardaseer, Esq. *Bombay.*
1834. Feb. 6.	†	Cust, Hon. Sir Edward, K.C.H. 30 *Hill-street.*
1828. June 5.	†	Daniell, Edmund Robert, Esq. *Birmingham.*
1814. May 5.	•	Daniell, John Frederic, Esq., D.C.L.—FOREIGN SECRETARY.—Professor of Chemistry, King's College, London, Socc. Phil. Batav., et Basil., Socius Honor. *Norwood.*
1822. Nov. 7.		Dartmouth, William, Earl of, D.C.L. F.S.A. 28 *St. James's-square; and Sandwell-park, Birmingham.*
1834. Jan. 29.		Darwin, Charles, Esq., M.A. Sec. G.S. *Down, near Bromley, Kent.*
1788. Feb. 21.		Darwin, Robert Waring, M.D. *Shrewsbury.*
1822. Dec. 19.		Daubeny, Charles Giles Bridle, M.D., Aldrich's Professor of Chemistry, and Regius Professor of Botany, Oxford. Hon. M.R.I.A. F.L.S. F.G.S. Coll. Reg. Med. Socius. *Oxford.*
1839. May 30.	†	Davenport, Edward Davies, Esq. 28 *Lower Brook-street; and Capesthorne, Cheshire.*
1831. June 16.		Davies, Griffith, Esq. *Palmer-terrace, Islington.*
1833. Apr. 18.		Davies, Thomas Stephens, Esq., F.R.S.E. F.S.A. *Royal Military Academy, Woolwich.*
1841. May 20.	†	Davis, Hart, Esq. *Hampstead-heath.*
1822. Mar. 28.		Davis, John Francis, Esq. *Portland-place; and Hollywood, near Compton, Bristol.*
1826. Jan. 19.		Davy, Edmund, Esq., Prof. of Chemistry to the Royal Dublin Society, M.R.I.A. *Dublin.*
1814. Feb. 17.		Davy, John, M.D. F.R.S.E. *Ambleside, Westmoreland.*
1815. Mar. 9.		Dawkins, James Colyer, Esq., F.S.A. *Ham-common, Richmond.*
1811. Feb. 28.		Dealtry, Rev. William, D.D. F.R.A.S. *Clapham-common.*
1819. Dec. 23.		De la Beche, Sir Henry Thomas, Knt. F.L.S. F.G.S., Director of the Ordnance Geological Survey of Great Britain. *Museum of Economic Geology,* 6 *Craig's-court, Charing-cross.*
1839. Feb. 28.	†	Denham, Henry Mangles, Esq., Commander R.N. 89 *Pall Mall; and Port Fleetwood.*
1841. May 20.	†	Denham, Rev. Joshua Frederick, M.A. 1 *New Inn.*
1838. Feb. 22.		Denison, William Thomas, Esq., Lieut. R.E. F.R.A.S. F.R.G.S. *Wood-street, Woolwich.*
1833. June 20.	†	Denman, Thomas, Lord. 38 *Portland-place; and Stoney Middleton, Derbyshire.*
1804. Feb. 2.		Dillwyn, Lewis Weston, Esq., F.L.S. F.G.S. *Sketty-hall, near Swansea.*
1832. June 7.	†	Disney, John, Esq., F.S.A. *The Hyde, near Ingatestone, Essex.*
1811. Mar. 21.		Dixon, Rev. Richard, M.A. *Niton, Isle of Wight.*
1835. June 4.	†	Dobson, Sir Richard, Knt. *Royal Hospital, Greenwich.*
1819. Dec. 23.		Dollond, George, Esq., F.R.A.S. 59 *St. Paul's Churchyard; and North-terrace, Camberwell.*
1838. Jan. 18.	†	Donkin, Bryan, Esq., F.R.A.S. 6 *Paragon, Kent-road.*
1842. Jan. 13.	†	Donkin, William Fishburn, Esq., M.A., Savilian Professor of Astronomy in the University of Oxford. *Oxford.*
1830. Jan. 28.		Douglas, George, Esq. *Chilston, Kent.*
1816. Jan. 25.	•	Douglas, Major-General Sir Howard, Bart. C.B. K.S.C. D.C.L. F.S.A. 15 *Green-street, Grosvenor square.*
1826. Mar. 9.		Douglas, William Robert Keith, Esq.
1815. Mar. 16.		D'Oyley, Rev. George, D.D. *Rectory, Lambeth.*
1836. Feb. 4.	†	Drory, George William, Esq. *Ghent.*
1839. Dec. 19.	†	Drummond, Henry, Esq. *Albury-park, Guildford, Surrey.*

Date of Election.	
1808. Dec. 8.	Duckett, Sir George, Bart., M.A. F.S.A. F.G.S. Hon. MR.I.S. *Roydon, near Ware, Hertfordshire.*
1825. Mar. 10.	D'Urban, Major-General Sir Benjamin, K.C.B. K.C.H. K.T.S.
1824. Feb. 19.	Durham, Edward Maltby, D.D. Lord Bishop of, F.S.A. 4 *Upper Portland-place; and Auckland-castle, Durham.*
1799. Apr. 11.	East, Right Hon. Sir Edward Hyde, Bart M.R.A.S. *Palladium-office, Waterloo-place; and Sherwood-lodge, Battersea.*
1838. Jan. 25.	† Eastlake, Charles Lock, Esq. R.A. 13 *Upper Fitzroy-street.*
1835. Feb. 5.	† Edye, John, Esq. 9 *Mecklenburg-square.*
1841. Jan. 21.	† Edye, Joseph, Esq. *Portsmouth.*
1831. Feb. 10.	Egerton, Sir Philip de Malpas Grey, Bart. F.G.S. 30 *Eaton-place; and Oulton-park, Cheshire.*
1815. Mar. 2.	Elliot, Sir William Francis, Bart. *Stobb's-castle; and Wells, N.B.*
1834. June 5.	Elliot, Hon. George, Capt. R.N.
1829. Mar. 19.	Elliotson, John, M.D. Coll. Reg. Med. Socius. 37 *Conduit-street.*
1835. Nov. 26.	† Elliott, Charles, Esq. 47 *Portland-place.*
1832. Apr. 5.	Elliott, Rev. Charles Boileau, M.A. 47 *Portland-place; and Tattingstone, Suffolk.*
1811. May 30.	* Ellis, Sir Henry, K.H. B.C.L. Sec. S.A. Hon. M.R.I.A. Hist. Scand. Holm. et Soc. Reg. Antiq. Hafn. Socius.—Soc. Reg. Antiq. Franc. Corresp. Principal Librarian of the British Museum. *British Museum.*
1819. Feb. 11.	Ellis, Right Hon. Henry, F.G.S.
1801. Mar. 12.	Ellis, John, Esq. F.L.S.
1832. June 7.	† Elphinstone, Howard, Esq. M.A. F.G.S. 19 *Eaton-place, Belgrave-square.*
1841. Jan. 14.	Enderby, Charles, Esq., F.L.S. *Greenwich.*
1829. Jan. 15.	Enniskillen, William Willoughby, Earl of, D.C.L. F.G.S. *Athenæum Club; and Florence-court, Fermanagh, Ireland.*
1827. Mar. 8.	Everest, Lieut.-Colonel George, Bengal Artillery, F.G.S. F.R.A.S. M.R.A.S. *Surveyor-General of India.* 16 *Bury-street, St. James's.*
1840. May 21.	† Ewer, Walter, Esq. 23 *Hanover-square.*
1824. Jan. 8.	Faraday, Michael, Esq., D.C.L., Fullerian Professor of Chemistry in the Royal Institution of Great Britain. Hon. Mem. R.S.E., and C.P.S. F.G.S. Instlt. Reg. (Acad. Sc.) Paris. Socius, Acad. Imp. Sc. Petrop. Socius Honor.—Acad. Reg. Sc. Holm., Soc. Reg. Sc. Hafn., Acad. Reg. Sc. Mut., Acad. Amer. Art. et Sc. Bost. Socius, Acad. Reg. Sc. Berol., Soc. Georg. Florent., Soc. Philom. Paris., et Acad. Reg. Med. Paris. Corresp. 21 *Albemarle-street.*
1839. May 2.	† Farre, Arthur, M.D. Coll. Reg. Med. Socius. 22 *Curzon-street, May-fair.*
1835. April 2.	† Featherstonhaugh, G. W., Esq. *Scarborough.*
1816. Feb. 29.	Fellowes, Sir James, Knt. M.D. Coll. Reg. Med. Socius. *Pangbourne-lodge, near Reading.*
1836. Mar. 3.	Field, Joshua, Esq. *Cheltenham-place, Lambeth.*
1842. May 5.	† Fielding, George Hunsley, M.D. *Albion-street, Kingston-upon-Hull.*
1825. Jan. 27.	Fisher, Rev. George, M.A. F.R.A.S. *Royal Hospital, Greenwich.*
1815. Nov. 9.	Fitton, William Henry, M.D. F.L.S. F.G.S. F.R.A.S. Coll. Reg. Med. Socius. 53 *Upper Harley-street.*
1811. Jan. 17.	Fitzwilliam, Charles William, Earl, F.S.A. F.G.S. *Mortimer-house, Grosvenor-place; and Wentworth-house, near Rotherham, Yorkshire.*

Date of Election.	
1839. Mar. 21.	Fletcher, Thomas William, Esq., F.S.A. *Dudley, Worcestershire.*
1834. Apr. 10.	† Folkes, Sir William Browne, Bart. *Hillington-hall, Lynn.*
1832. June 7.	Forbes, James David, Esq., Professor of Natural Philosophy in the University of Edinburgh. Sec. R.S.E. F.G.S. Instit. Reg. Sc. Paris. Corresp. *Edinburgh.*
1829. Feb. 5.	Forbes, John, M.D. Coll. Reg. Med. Socius. 12 *Old Burlington-street.*
1822. Feb. 21.	Forbes, William Nairn, Esq., F.G.S.
1828. June 12.	† Forshall, Rev. Josiah, M.A. F.S.A. Hon. M.R.I.A. M.R.S.L. *British Museum.*
1821. Feb. 22.	Forster, Edward, Esq. V.P.L.S. 11 *Mansion-house-street; and Woodford, Essex.*
1817. June 5.	Fortescue, Hugh, Earl. 17 *Grosvenor-square; and Castle-hill, Southmolton.*
1802. April 1.	Fowler, Richard, M.D. F.S.A. *Salisbury.*
1823. Feb. 20.	Franklin, Sir John, Knt. Capt. R.N. D.C.L. F.L.S. V.P.R.G.S. F.G.S. F.R.A.S. Soc. Geogr. Paris. Corresp. *Athenæum.*
1821. Dec. 12.	Franks, William, Esq., M.A. *Wood-hill, Hatfield, Hertfordshire.*
1837. June 8.	Frere, George Edward, Esq. *Twerton, near Bath.*
1834. Apr. 10.	† Freshfield, James William, Esq., F.G.S. 15 *Regent-street; and Leatherhead, Surrey.*
1820. Mar. 16.	Friend, Matthew Curling, Esq., Lieut. R.N. *George Town, Van Diemen's Land.*
1839. Jan. 10.	† Frodsham, William James, Esq. *Change-alley, Cornhill.*
1834. Dec. 18.	† Galloway, Thomas, Esq., M.A. F.R.A.S. 45 *Torrington-square.*
1816. April 4.	Gardiner, Rev. Samuel John, M.A.
1839. Mar. 21.	Gaskin, Rev. Thomas, M.A. F.R.A.S. *Jesus-college, Cambridge.*
1840. April 9.	† Gassiot, John P., Esq. *Clapham-common.*
1796. Feb. 18.	Gibbes, Sir George Smith, Knt. M.D. F.L.S. Coll. Reg. Med. Socius. *Bath.*
1834. Apr. 10.	Gilbert, John Davies, Esq., M.A. *Eastbourne, Sussex; and Tredrea, Cornwall.*
1828. Mar. 27.	Glenelg, Charles, Lord, D.C.L. M.R.S.L. *Glenelg, Inverness; and 91 Wimpole-street.*
1832. June 7.	† Glover, Rev. George, M.A., Archdeacon of Sudbury. *Southreppo, Norfolk.*
1838. Feb. 8.	Glynn, Joseph, Esq. *Butterley, Derbyshire.*
1839. Mar. 7.	† Godwin, George, jun., Esq., F.S.A. 11 *Pelham-crescent, Brompton.*
1808. May 26.	Goldingham, John, Esq., F.R.A.S. M.R.A.S. *Worcester.*
1828. Mar. 13.	Goldsmid, Sir Isaac Lyon, Bart. F.S.A. F.L.S. F.G.S. F.R.A.S. M.R.S.L. *Park-lodge, Regent's-park.*
1819. Jan. 29.	Gompertz, Benjamin, Esq., F.R.A.S. *Kennington-terrace, Vauxhall.*
1824. April 1.	Goodenough, Very Rev. Edmund, D.D. Dean of Wells, F.L.S. *The Deanery, Wells.*
1835. April 2.	† Gordon, James Alexander, M.D. Coll. Reg. Med. Socius. 71 *Lower Grosvenor-street.*
1801. June 11.	Gordon, Lieut.-General Sir James Willoughby, Bart. K.C.B. G.C.H. *Near the Royal Hospital, Chelsea.*
1830. Dec. 9.	Gordon, Henry Percy, Esq., M.A. *Near the Royal Hospital, Chelsea.*
1821. Feb. 8.	Gordon, Thomas, Esq. *Zante, Greece.*
1820. Apr. 27.	Goulburn, Right Hon. Henry, D.C.L. 11 *and* 12 *Downing-street.*
1843. Jan. 19.	Gould, John, Esq., F.L.S. 20 *Broad-street, Golden-square.*
1831. Dec. 22.	Graham, Rt. Hon. Sir James R. G., Bart. 31 *Hill-street; and Netherby, Cumberland.*
1836. Dec. 25.	Graham, Thomas, Esq. M.A. F.R.S.E. Professor of Chemistry, University-college, London.—Acad. Reg. Sc. Berolin. et Monach. Corresp. 9 *Torrington-square.*
1840. May 21.	† Grant, Thomas Tassell, Esq. *Royal Clarence Victualling-yard, Portsmouth.*
1836. Feb. 4.	Grant, Robert Edmond, M.D. F.R.S.E. F.L.S. Professor of Comparative Anatomy and Zoology in University-college. 10 *Seymour-place North, Euston-square.*

Date of Election.	
1817. Nov. 20.	Granville, Augustus Bozzi, M.D. F.G.S. M.R.A.S. Acadd. Reg. Sc. Brux., et Taur.: Acadd. Luc. et Pat.: Socc. Geogr. Flor., Ital., Vienn., Sc. Nat. Neap., Athen. Ven., Philom. Paris., Socius.—Acad. Imp. Sc. Petrop. Corresp. 109 *Piccadilly; and Rosemont, Great Missenden, Buckinghamshire.*
1832. Feb. 2.	Gravatt, William, Esq. 34 *Parliament-street.*
1839. Apr. 18.	Graves, John Thomas, Esq., M.A. 8 *Gray's-inn-square.*
1832. Feb. 2.	Gray, John Edward, Esq., F.G.S. F.R.G.S. Soc. Imp. Hist. Nat. Mosc. Acadd. Lync. Romæ, Sc. Nat. Philad. et Hist. Nat. Boston., Socius. *British Museum.*
1825. Feb. 24.	Green, Joseph Henry, Esq., Professor of Anatomy to the Royal Academy, F.G.S. *Barnet.*
1807. Mar. 5.	Greenough, George Bellas, Esq, F.L.S. F.G.S. M.R.A.S. *Grove-house, Regent's-park.*
1833. Feb. 7.	Greig, Woronzow, Esq., M.A. 14 *Lower Belgrave-street, Eaton-square.*
1830. June 10.	Gresswell, Rev. Richard, M.A. *Worcester-college, Oxford.*
1815. Feb. 16.	Grey, Sir Thomas, Knt. M.D. F.L.S. *Ramsgate.*
1841. Apr. 29.	† Grey, Thomas Philip, Earl de. 4 *St. James's-square; and West-park, Silsoe, Bedfordshire.*
1834. Apr. 10.	† Griffith, Edward, Esq. F.S.A. *Downshire-hill, Hampstead.*
1806. May 1.	Griffiths, John, Esq.
1840. Nov. 26.	Grove, William Robert, Esq., M.A. 4 *Hare-court, Temple.*
1830. Apr. 22.	Grover, Capt. John, F.R.A.S. *Army and Navy-club.*
1839. June 20.	Guest, Edwin, Esq. 4 *King's-bench-walk, Temple.*
1830. June 10.	Guest, Sir Josiah John, Bart. F.G.S. 8 *Spring-gardens; and Dowlais Iron-works, Glamorganshire.*
1839. Mar. 7.	Gulliver, George, Esq. *Regent's-park Barracks.*
1818. Jan. 15.	Gurney, Hudson, Esq. V.P.S.A. M.R.S.L. 9 *St. James's-square; and Keswick-hall, near Norwich.*
1827. May 24.	Guthrie, George James, Esq. 4 *Berkeley-street, Piccadilly.*
1844. Apr. 18.	† Haddington, Right Hon. Thomas, Earl of, First Lord of the Admiralty. *Tyninghame-castle, Dunbar.*
1801. May 7.	Hailstone, Rev. John, M.A. F.L.S. F.G.S. *Trumpington, Cambridgeshire.*
1820. Apr. 27.	* Hall, Sir John, Bart. F.R.S.E. F.G.S. *Dunglass, Dunbar, Haddingtonshire.*
1832. April 5.	Hall, Marshall, M.D. F.R.S.E. Coll. Reg. Med. Socius. 14 *Manchester-square.*
1827. Nov. 22.	Hall, Thomas Henry, Esq. M.A. 49 *Tavistock-square.*
1821. Mar. 8.	Hallam, Henry, Esq., M.A. Trust. Brit. Mus. V.P.S.A. F.G.S. F.R.A.S. M.R.S.L. Instit. Reg. Sc. Paris. Socius. 24 *Wilton-crescent, Knightsbridge.*
1839. May 30.	† Halliwell, James Orchard, Esq., Hon. M.R.I.A. F.S.A. L. & E. F.R.A.S. Hon. M.R.S.L., Socc. Reg. Antiq. Franc., Reg. Antiq. Septen. Hafn., Ethnol. Paris., Reg. Geogr. Paris., Asiatic. Paris., Corresp. 10 *Fitzroy-street; Islip, Oxfordshire.*
1835. Feb. 5.	† Hamett, Sir John, Knt. M.D.
1808. Jan. 14.	Hamilton and Brandon, Alexander, Duke of, F.S.A. 12 *Portman-square; and Hamilton-palace, Lanarkshire.*
1828. Jan. 17.	Hamilton, Rev. H. Parr, M.A. F.G.S. F.R.A.S. *Wath Rectory, near Ripon.*
1813. April 8.	Hamilton, William Richard, Esq, V.P.S.A. For. Sec. R.S.L. Acad. Reg. Sc. Berolin. Socius Honor. 12 *Bolton-row, May-fair.*
1838. Jan. 18.	† Hansler, Sir John Jacob, Knt. F.S.A. 52 *Upper Bedford-place, Russell-square.*
1824. Apr. 29.	Harcourt, Rev. Wm. Venables Vernon, M.A. Hon. M.R.I.A. F.G.S. *Weldrake, near York.*

Date of Election.		
1838. April 5.	†	Hardwick, John, Esq, D.C.L. 5 *K, Albany, Piccadilly.*
1831. Dec. 8.		Hardwick, Philip, Esq., R.A. F.S.A. 60 *Russell-square.*
1839. Jan. 17.	†	Hardy, Peter, Esq. 37 *Old Jewry; and Addiscombe, near Croydon.*
1823. May 29.		Harford, John Scandret, Esq., D.C.L.
1844. Apr. 18.	†	Hargreave, Charles James, Esq., B.L., Professor of Jurisprudence, University-college, London. 69 *Chancery-lane.*
1835. Feb. 5.	†	Harris, John Greathed, Esq., M.A. 2 *Old Palace-yard.*
1831. June 2.		Harris, William Snow, Esq. *Windsor Villas, Plymouth.*
1825. Feb. 17.		Harvey, Henry, Esq., F.R.A.S. 59 *Regency-square, Brighton.*
1835. April 2.	†	Harvey, Major-General Sir Robert John, C.B. K.T.S. K.S.B. F.S.A. *United Service Club; and Moushold-house, near Norwich.*
1827. May 24.	†	Harwood, John, M.D. F.L.S. *St. Leonard's, Hastings.*
1812. Jan. 9.		Hasted, Rev. Henry, M.A. F.L.S. *Bury, Suffolk.*
1797. Mar. 9.		Hatchett, Charles, Esq., F.R.S.E. F.S.A. F.L.S. Instit. Reg. Sc. Paris. Corresp.,—Acad. Reg. Sc. Monach., et Soc. Œcon. Petrop., Socius. *Belle-Vue-house, Chelsea; and Bollington, Lincolnshire.*
1821. Nov. 15.		Haughton, Sir Graves Chamney, K.H. M.A. Hon. M.R.I.A. M.R.A.S., Instit. Reg. Sc. Paris. Socius, Acad. Reg. Berolin. Corresp. 14 *Grafton-street, Bond-street.*
1834. Dec. 18.		Hawkins, Bissett, M.D., Coll. Reg. Med. Socius. 30 *Golden-square.*
1821. May 24.	*	Hawkins, Edward, Esq., F.S.A. F.L.S. *British Museum.*
1791. May 5.		Hawkins, John, Esq. *Quay-house, Devonshire.*
1830. June 10.		Hawkins, John Heywood, Esq., M.A. F.G.S. 8 *Suffolk-street; and Bignor-park, Petworth, Sussex.*
1835. Nov. 19.	†	Hawkins, Rev. William, B.L. M.A. 23 *Great Marlborough-street.*
1814. Mar. 3.		Hay, Robert William, Esq., F.S.A.
1818. May 28.	*	Heath, George Crauford, Esq. *Cambridge.*
1843. Feb. 2.	†	Heath, John Benjamin, Esq., F.S.A. 66 *Russell-square.*
1791. Feb. 24.		Heberden, William, M.D. Coll. Reg. Med. Socius. 24 *Cumberland-street.*
1834. Apr. 10.		Henry, William Charles, M.D. *Haffield, near Ledbury, Herefordshire.*
1840. Feb. 27.	†	Henwood, William Jory, Esq. 4 *Clarence-street, Penzance.*
1813. May 27.		Herschel, Sir John Frederick William, Bart. D.C.L. M.A. Trust. Brit. Mus. F.R.S.E. Hon. M.R.I.A. F.G.S. M.C.P.S. Instit. Reg. Sc. Paris. Corresp.—Acadd. Imp. Sc. Petrop., Reg. Berol., Neap. et Brux.: Socc. Reg. Gotting., Hafn. et Harl.: Acadd. Lync. Romæ, Pat., Bonon., Panorm., Gioen. Catan. et Divion. ex intim., Socc. Philom. Paris., Ital. Mut., Helvet., Socius. *Collingwood, near Hawkhurst, Kent.*
1843. April 6.		Heygate, James, M.D. *College-house, Derby.*
1843. Jan. 19.		Heywood, Sir Benjamin, Bart. 9 *Hyde-park-gardens; and Claremont, Manchester.*
1839. Feb. 7.		Heywood, James, Esq., F.S.A. *Athenæum; and Acresfield, Manchester.*
1820. Mar. 23.		Higman, Rev. John Philip, M.A. F.G.S. F.R.A.S. *Trinity-college, Cambridge.*
1839. Jan. 10.	†	Hilton, John, Esq. *St. Thomas's-street, Southwark.*
1809. Dec. 21.		Hoare, Charles, Esq., F.S.A. 37 *Fleet-street.*
1814. May 19.		Hobhouse, Right Hon. Sir John Cam, Bart. M.A. 42 *Berkeley-square.*
1811. June 27.		Hoblyn, Thomas, Esq. F.L.S.
1841. Feb. 18.		Hodgkinson, Enton, Esq., F.G.S. 14 *Salford-crescent, Manchester.*
1831. Apr. 14.		Hodgson, Joseph, Esq. *Birmingham.*

Date of Election.	
1839. June 20.	† Hogg, John, Esq., M.A. F.L.S. F.C.P.S. M.R.S.L. 12 *King's-bench-walk, Inner Temple; and Norton-house, Stockton-upon-Tees.*
1837. Jan. 19.	Holland, Charles, M.D. 16 *Queen-street, May-fair.*
1815. Jan. 19.	Holland, Henry, M.D. F.G.S. Coll. Reg. Med. Socius. 25 *Brook-street.*
1826. Feb. 2.	Holman, James, Esq. Lieut. R.N. F.L.S. *Windsor.*
1825. Apr. 21.	Home, Sir Everard, Bart. Capt. R.N. F.S.A. H.M. Ship North Star.
1843. Dec. 7.	† Hood, Charles, Esq., F.R.A.S. *Earl-street, Blackfriars.*
1812. Jan. 9.	Hooker, Sir William Jackson, K.H. LL.D. Hon. M.R.I.A. F.S.A. F.L.S. F.G.S. Acad. Cæs. Nat. Cur. Socius. *Kew.*
1834. June 5.	† Hope, Rev. Frederick William, M.A. F.L.S. 56 *Upper Seymour-street.*
1837. June 1.	† Hopkins, William, Esq. M.A. *St. Peter's-college, Cambridge.*
1841. May 20.	Hoppus, Rev. John, LL.D. Ph.D. Professor of Philosophy and Logic, University-college, London. 29 *Camden-street, Camden-town.*
1834. Feb. 6.	Horne, James, Esq. *Clapham-common.*
1813. Nov. 11.	Horner, Leonard, Esq., F.R.S.E. V.P.G.S. Soc. Sc. Harlem. Socius. 2 *Bedford-place.*
1828. Jan. 10.	† Horsfield, Thomas, M.D. F.L.S. F.G.S. M.R.A.S. Acad. Cæs. Nat. Cur. Socius. 20 *Stonefield-street, Islington.*
1843. May 25.	Hoskins, Samuel Elliott, M.D. *Guernsey.*
1794. April 3.	Howard, Colonel Hon. Fulk Greville, F.S.A. 16 *Grosvenor-square.*
1821. Mar. 8.	Howard, Luke, Esq. *Bruce-grove, Tottenham; and Ackworth-villa, Pomfret.*
1834. Apr. 10.	Hudson, Robert, Esq., F.G.S. *Clapham-common.*
1818. Jan. 8.	Hume, Joseph, Esq. 6 *Bryanston-square.*
1819. Nov. 11.	Hunt, Rev. George, M.A. F.S.A. *Egg Buckland, near Plymouth.*
1837. April 6.	† Hunter, Robert, Esq., F.G.S. F.S.A. *Highgate.*
1819. Nov. 18.	Hustler, Rev. James Devereux, B.D. *Euston-rectory, near Thetford, Norfolk.*
1829. Mar. 19.	Hutchinson, Lieut.-Colonel George, E.I.C.S. *Cedars, Putney.*
1840. June 4.	† Hutton, William, Esq. *Newcastle-upon-Tyne.*
1844. Feb. 29.	† Hyett, William Henry, Esq. *Painswick-house, Painswick.*
1838. May 31.	Hymers, Rev. John, D.D. *St. John's-college, Cambridge.*
1813. Mar. 4.	Inglis, Sir Robert Harry, Bart. LL.D. Trust. Brit. Mus. F.S.A. F.R.A.S. 7 *Bedford-square; and Battersea-rise, Clapham.*
1807. Apr. 23.	Jacob, William, Esq. Instit. Sc. Paris. Corresp. 31 *Cadogan-place, Sloane-street.*
1826. May 25.	Jameson, Robert, Esq., Regius Professor of Natural History, Edinburgh. F.R.S.E. Hon. M.R.I.A. F.L.S. F.G.S. Acad. Reg. Sc. Neap.: Socc. Reg. Sc. Dan., Imp. Hist. Nat. Mosc., Hist. Nat. Veter. et Paris., Philom. Paris., Amer. Philad., Phil. et Hist. Nov.-Ebor., Socius.—Acad. Reg. Sc. Berol. Corresp. *Edinburgh.*
1841. Jan. 7.	† Jeffereys, Julius, Esq. *Clapham.*
1840. April 2.	† Jeffreys, John Gwyn, Esq., F.L.S. *Swansea.*
1841. Feb. 18.	† Jenkins, Sir Richard, G.C.B. 7 *Mansfield-street, Portland-place; and Bickton-hall, Shrewsbury.*
1821. Mar. 1.	Jennings, Rev. Philip, D.D. *Hampstead-green.*
1838. Mar. 15.	† Jervis, Thomas Best, Esq. Major E.I.C.E. F.L.S. F.G.S. F.R.A.S. 9 *Regent's Villas, Avenue-road, Regent's-park.*
1842. May 5.	† Jesse, John, Esq., F.R.A.S. F.L.S. *Ardwick, near Manchester.*
1842. Mar. 10.	† Johnson, Cuthbert William, Esq. 14 *Gray's-inn-square.*

Date of Election.

1836. Mar. 10. † Johnson, Edward John, Esq. Captain R.N. 18 *Clement's-inn.*

1838. Jan. 18. Johnson, Rev. George Henry Sacheverell, M.A. Professor of Moral Philosophy in the University of Oxford.

1810. Nov. 22. Johnston, Right Hon. Sir Alexander, Knt. F.S.A. V.P.R.A.S. 19 *Great Cumberland-place; and York-house, Twickenham.*

1837. June 15. † Johnston, James F. W., Esq., M.A. F.R.S. Ed. Professor of Chemistry and Mineralogy in the University of Durham.

1835. June 4. † Jones, Thomas, Esq., F.R.A.S. 62 *Charing-cross; and West-square.*

1844. Mar. 21. Jones, Thomas Rymer, Esq. *King's-college; and* 120 *Camden-road Villas.*

1840. Apr. 30. † Jones, Thomas Wharton, Esq. 35 *George-street, Hanover-square.*

1840. Nov. 19. Kater, Edward, Esq., F.G.S. M.R.I.A. *Mexborough, Yorkshire; and Athenæum.*

1838. Dec. 6. † Kelland, Rev. Philip, M.A. F.R.S.E. M.C.P.S. Professor of Mathematics in the University of Edinburgh. *Edinburgh.*

1844. Feb. 29. † Kerigan, Thomas, Esq., R.N. 9 *St. Paul's-square, Southsea, Portsmouth.*

1841. Mar. 18. † Kerrison, Robert Masters, M.D. 12 *New Burlington-street.*

1822. Mar. 28. Kidd, John, M.D. Regius Professor of Medicine, and Aldrich's Professor of Anatomy, Oxford, F.L.S. F.G.S. Coll. Reg. Med. Socius. *Oxford.*

1834. Dec. 18. Kiernan, Francis, Esq. 30 *Manchester-street, Manchester-square.*

1824. Feb. 26. King, Philip Parker, Esq. Captain R.N. F.L.S. *Dunheved, New South Wales.*

1818. Mar. 5. Kirby, Rev. William, M.A. F.L.S. F.G.S. Acad. Cæs. Nat. Cur., et Soc. Nat. Scrutat. Berol. Socius. *Barham, near Ipswich.*

1841. May 20. † Knight, Henry Gally, Esq., F.L.S. 69 *Grosvenor-street.*

1830. Mar. 4. Knowles, Sir Francis Charles, Bart. M.A. 2 *Harcourt-buildings, Temple.*

1810. Jan. 18. • Konig, Charles, Esq., K.H. Hon. M.R.I.A. F.L.S. Acad. Reg. Sc. Monach. Socius.—Acad. Imp. Sc. Petrop., et Soc. Reg. Gotting. Corresp.—Soc. Imp. Hist. Nat. Mosc. Socius.—Acad. Panorm., et Soc. Veterav., Sodalis. *British Museum.*

1843. Nov. 23. Laing, Rev. David. 1 *Cambridge-terrace, Regent's-park.*

1811. April 4. Lansdowne, Henry, Marquis of, D.C.L. Trust. Brit. Mus. M.R.S.L. 52 *Berkeley-square; and Bowood-park, Wiltshire.*

1844. May 16. Larcom, Thomas Aiskew, Capt. R.E.

1813. Nov. 11. Lawrence, William, Esq. 18 *Whitehall-place.*

1840. May 21. † Lawson, Henry, Esq. 7 *Lansdown-crescent, Bath.*

1815. Apr. 13. Leake, Lieut.-Colonel William Martin, M.R.S.L. Acad. Reg. Sc. Berol. Socius Honor. Instit. Reg. Paris. Corresp. 50 *Queen-Anne-street.*

1843. May 11. † Le Couteur, Colonel John. *Belle Vue, Jersey.*

1831. Feb. 24. Lee, John, LL.D. F.R.A.S. 5 *College, Doctors'-commons; and Hartwell-house, near Aylesbury, Buckinghamshire.*

1830. Mar. 25. Lee, Robert, M.D. Coll. Reg. Med. Socius. 4 *Saville-row.*

1820. Nov. 16. Lefevre, John George Shaw, Esq., M.A. Vice-Chancellor of the University of London. *Board of Trade, Whitehall.*

1817. June 12. Legh, Thomas, Esq., D.C.L. *Lyme-park, Cheshire.*

1822. May 23. Lemon, Sir Charles, Bart. 46 *Charles-street, Berkeley-square; and Carclew, near Falmouth, Cornwall.*

1836. May 5. † Lewis, Thomas Locke, Esq. Capt. R.E. F.G.S. *Ibsley-cottage, Exeter.*

1811. Mar. 7. Lincoln, John Kaye, Lord Bishop of. *Cambridge; and Buckden-palace, Huntingdonshire.*

Date of Election.	
1828. Jan. 17.	† Lindley, John, Phil. D. F.L.S. Acad. Reg. Berol. Corresp.; Acad. Cæs. Nat. Cur., Socc. Physiogr. Lund., Linn. Holm., Socius.—Soc. Batav. Sc., Lyc. Nat. Hist. Nov.-Ebor., Socius Honor.—Prof. Bot. Univ. Coll. Lond. 21 *Regent-street.*
1832. Feb. 2.	Lister, Joseph Jackson, Esq. *Upton, Essex.*
1841. May 13.	† Liston, Robert, Esq. 5 *Clifford-street, New Bond-street.*
1836. Feb. 4.	Llewelyn, John Dillwyn, Esq., F.L.S. *Penllegare, Glamorgan.*
1818. Mar. 12.	Lloyd, Edward, Esq. Captain R.N.
1830. Mar. 11.	† Lloyd, John Augustus, Esq. *Port Louis, Mauritius.*
1834. Apr. 10.	Lloyd, Rev. William Forster, M.A. *Missenden, Bucks.*
1836. Jan. 21.	Lloyd, Rev. Humphrey, M.A. M.R.I.A. *Dublin.*
1838. Feb. 22.	† Locke, Joseph, Esq. 6 *Chester-terrace, Regent's-park.*
1811. Dec. 5.	Locker, Edward Hawke, Esq., F.S A. *Royal Hospital, Greenwich.*
1841. Nov. 25.	† Lovelace, William King, Earl of. 10 *St. James's square; Ockham-park, Ripley, Surrey; and Ashley-combe, Postock, Somerset.*
1834. Dec. 18.	† Lowe, George, Esq. 39 *Finsbury-circus.*
1810. July 5.	Lowther, William Viscount, F.S.A. 14 *Carlton-terrace; and Lowther-castle, near Penrith.*
1829. Jan. 15.	Lubbock, Sir John William, Bart. M.A.—Vice-President and Treasurer.—F.L.S. F.R.A.S. M.R.A.S. 28 *St. James's-place; and High Elms, Farnborough, Kent.*
1826. Feb. 2.	Lyell, Charles, Jun. Esq., M.A. F.L.S. F.G.S. 16 *Hart-street, Bloomsbury.*
1826. Apr. 13.	Lyndhurst, John Singleton, Lord, Lord Chancellor, D.C.L. 25 *George-street, Hanover-square.*
1840. Apr. 30.	† Lyttleton, George William, Lord. 39 *Grosvenor-place; and Hagley-park, near Stourbridge, Worcestershire.*
1843. Feb. 2.	MacCullagh, James, Esq., C.D.L. Professor of Natural Experimental Philosophy in the University of Dublin. *Trinity-college, Dublin.*
1816. Mar. 14.	MacGrigor, Sir James, Bart. F.R.S.E. Coll. Reg. Med. Socius. *Camden-hill, Kensington.*
1815. Apr. 13.	Mackenzie, Sir George Steuart, Bart. F.R.S.E. *Coul, Ross-shire.*
1817. May 15.	Mackie, Rev. John William, M.A. 27 *Upper Baker-street.*
1827. June 14.	Mackinnon, William Alexander, Esq., M.A. F.S.A. F.G.S. 4 *Hyde-park-place; and Newton-park, Lymington, Hants.*
1831. Dec. 8.	Maclear, Thomas, Esq., F.R.A.S. Astronomer Royal at the Cape of Good Hope.
1809. Jan. 19.	MacLeay, Alexander, Esq., F.L.S. Acad. Reg. Sc. Holm. Socius, et Acad. Reg. Sc. Taurin. Corresp. *Sydney, New South Wales.*
1839. May 30.	† Macmurdo, Gilbert Wakefield, Esq. *St. Thomas's Hospital; and 7 New Broad-street.*
1838. April 5.	† Macneill, Sir John, F.R.A.S. M.R.I.A. 9 *Whitehall-place.*
1832. Feb. 2.	† Madden, Sir Frederick, K.H. Hon. M.R.I.A. F.S.A. Soc. Reg. Antiq. Septen. Hafn. Socius. *British Museum.*
1817. June 12.	Maddy, Rev. John, D.D. F.S.A. F.R.A.S. *Somertown, Bury St. Edmunds.*
1819. June 24.	Magrath, Sir George, K.H. M.D. M.R.I.A. F.L.S. F.G.S. *Plymouth.*
1827. Mar. 22.	† Mahon, Philip H., Viscount, D.C.L. V.P.S.A. 41 *Grosvenor-place; and Chevening-place, Kent.*
1839. Apr. 18.	† Maitland, Rev. Samuel Roffy. *Lambeth-palace.*
1829. May 28.	Maitland, Ebenezer Fuller, Esq., F.S.A. *Henley-on-Thames, Oxfordshire.*
1821. June 28.	* Majendie, Ashurst, Esq., F.G.S. *Hedingham-castle, Castle Hedingham, Essex.*

Date of Election.	
1831. May 12.	Manby, George William, Capt. R.N. *Yarmouth.*
1825. Jan. 20.	Mangles, James, Esq., Capt. R.N. 66 *Cambridge-terrace, Edgware-road.*
1825. Nov. 24.	Mantell, Gideon Algernon, Esq., LL.D. F.L.S. F.G.S. Coll. Reg. Med. Socius, Soc. Philom. Paris. Corresp. Acadd. Philad. et Connect., Socius Honor. 19 *Chester-square, Pimlico.*
1836. Jan. 28.	Marcet, Francis, Esq. *Geneva.*
1816. Mar. 28.	Markland, James Heywood, Esq., F.S.A. *Bath.*
1819. May 13.	Marryatt, Frederick, Esq., Capt. R.N. *Wimbledon.*
1832. Feb. 2.	Mauley, Lord de. 24 *George-street, Hanover-square; and Canford-house, near Wimborne, Dorset.*
1829. Feb. 26.	Maxwell, John, Esq. *Pollock, Renfrewshire.*
1827. Mar. 1.	† Mayo, Rev. Charles, B.D. F.S.A. *Colesgrove, near Cheshunt, Hertfordshire.*
1828. Apr. 17.	† Mayo, Herbert, Esq.
1835. June 4.	† Mayo, Thomas, M.D Coll. Reg. Med. Socius. 56 *Wimpole-street.*
1841. Feb. 25.	† Melbourne, William, Viscount. 39 *South-street, Grosvenor-square; and Brocket-hall, Herts.*
1841. Jan. 14.	† Melvill, James Cosmo, Esq. *East India House.*
1817. May 15.	Melville, Robert, Viscount, K.T. F.R.A.S. 3 *Somerset-place; and Melville-castle, Edinburgh.*
1838. May 3.	† Merewether, Very Rev. John, D.D. Dean of Hereford, F.S.A.
1843. Mar. 9.	† Miers, John, Esq. *Temple Lodge, Hammersmith.*
1843. Mar. 30.	† Miller, Joseph, Esq. *Monastery Cottage, East-India road.*
1827. May 24.	Miller, Lieut.-Colonel George, C.B. 2 *Stone-buildings, Lincoln's-inn.*
1838. Feb. 8.	Miller, William Hallows, Esq. M.A. Professor of Mineralogy. *Cambridge.*
1836. Mar. 3.	Minto, Gilbert Elliot Murray Kynynmound, Earl of, F.R.A.S. *Minto-castle, Roxburghshire.*
1835. Nov. 26.	Molesworth, Sir William, Bart. 1 *Lowndes-square; and Pencarrow, Cornwall.*
1841. Apr. 29.	† Monteagle, Thomas, Lord. 37 *Lower Brook-street; and Exchequer-office, Whitehall.*
1836. June 16.	Montefiore, Sir Moses, Knt. 7 *Grosvenor-gate, Park-lane; and East Cliff-lodge, Ramsgate.*
1806. May 6.	Moore, Major Edward, F.S.A. M.R.A.S. *Bealings, near Woodbridge, Suffolk.*
1835. April 2.	† Moore, George, Esq., F.S.A. F.L.S. 64 *Lincoln's-inn-fields.*
1827. Feb. 8.	Moreau, César, Esq. Acadd. Reg. Divion., Burd., et Masil., Socius. *Paris.*
1835. April 2.	† Morgan, Arthur, Esq. 26 *New Bridge-street, Blackfriars.*
1816. May 30.	Morgan, Charles, Esq, F.S.A. 70 *Pall-mall; and Tredegar-house, near Newport, Monmouthshire.*
1832. Feb. 2.	† Morgan, Octavius S., Esq., M.A. F.S.A. 70 *Pall-mall; and Tredegar-park, Monmouthshire.*
1819. Feb. 4.	Morier, James, Esq. 22 *Charles-street, Berkeley-square.*
1831. Mar. 10.	Morris, John Carnac, Esq.
1842. Mar. 3.	† Morison, Major-General William, C.B. F.R.S.E. *Oriental-club.*
1839. Feb. 7.	† Moseley, Rev. Henry, M.A. *Wandsworth.*
1830. Feb. 18.	Moss, Joseph William, M.B. *Dudley.*
1822. Dec. 5.	Mudge, Rich. Zachariah, Esq., Lieut.-Col. R.E. *Beechwood, Plympton, Devon.*
1826. April 6.	Murchison, Roderick Impey, Esq., M.A.—VICE-PRESIDENT.—Hon. M.R.I.A. F.G.S. F.L.S. Inst. Reg. Sc. Paris. Corresp., Reg. Acad. Taur., et Soc. Imp. Sc. Nat. Hist. Mosq. Socius. President of the Royal Geographical Society. 16 *Belgrave-square.*

Date of Election.		
1805. July 4.		Murdoch, Thomas, Esq., F.S.A. 8 *Portland-place.*
1823. June 19.		Murray, Right Hon. Sir George, G.C.B. G.C.H. K.T.S. 5 *Belgrave-square; and Bleaden, Perthshire.*
1826. Mar. 16.		Mylne, William Chadwell, Esq, F.R.A.S. *New-River-head.*
1820. May 18.	*	Napier, Henry, Esq. Capt. R.N. *Florence.*
1817. June 12.		Napier, Macvey, Esq., F.R.S.E. *Edinburgh.*
1840. June 18.	†	Narrien, John, Esq., F.R.A.S., Professor of Mathematics in the Royal Military College, Sandhurst.
1814. May 5.		Neave, Sir Thomas, Bart. F.S.A. 6 *Albemarle-street; and Dagnam-park, Rumford, Essex.*
1842. Jan. 6.		Newbold, Thomas John, Esq., Lieut. E.I.C.S. *Madras.*
1833. Feb. 7.	†	Nolan, Rev. Frederick, LL.D. M.R.S.L. *Prittlewell, Essex.*
1842. Dec. 15.		Norfolk, The Most Noble Howard, Duke of. 1 *Hyde-park-place.*
1830. May 27.		Northampton, Spencer Joshua Alwyne, Marquis of.—PRESIDENT.—Trust. Brit. Mus., F.S.A. Hon. M.R.I.A. F.L.S. F.G.S. 145 *Piccadilly; and Castle Ashby, Northampton.*
1823. May 1.		Northumberland, Hugh, Duke of, K.G. M.A. Trust. Brit. Mus. F.S.A. F.L.S. F.G.S. *Northumberland-house, Strand.*
1840. June 4.	†	Norwich, Edward Stanley, Lord Bishop of, President of the Linnean Society. 38 *Lower Brook-street; and Palace, Norwich.*
1826. Feb. 2.	†	Ogle, James Adey, M.D. F.R.A.S. Coll. Reg. Med. Socius. Lord Lichfield's, and Aldrich's Professor of Medicine, Oxford.
1786. Nov. 16.		Oldershaw, Venerable John, B.D. Archdeacon of Norfolk. *Harlestone, Norfolk.*
1835. June 4.		Oliveira, Benjamin, Esq., F.S.A. 8 *Upper Hyde-park-street.*
1824. Mar. 4.		Orford, Horatio, Earl of. *White's Club; and Wolterton-park, Norfolk.*
1819. Feb. 25.		Ormerod, George, Esq., D.C.L. F.S.A. F.G.S. *Sudbury-park, Gloucestershire.*
1843. Mar. 16.	†	O'Shaughnessy, William Brooke, Esq., M.D. *Calcutta.*
1838. May 3.		Outram, Benjamin Fonseca, M.D. F.R.G.S. 1 *Hanover-square.*
1834. Dec. 18.		Owen, Richard, Esq., M.D. F.L.S. F.G.S. Instit. Sc. Paris. Corresp. Fellow and Hunterian Professor of Anatomy and Physiology in the Royal College of Surgeons of England. *Royal College of Surgeons, Lincoln's-inn-fields.*
1821. Nov. 15.		Palgrave, Sir Francis, K.H. Deputy Keeper of Her Majesty's Records. *Rolls'-yard, Chancery-lane; and Hampstead-green.*
1821. June 21.	*	Paris, John Ayrton, M.D. President of the Royal College of Physicians. 28 *Dover-street.*
1824. Mar. 4.		Parish, Sir Woodbine, K.C.H. F.S.A. F.G.S. *Naples.*
1815. June 1.		Parker, Thomas Lister, Esq., F.S.A. 34 *Mount-street.*
1840. Feb. 6.	†	Parkinson, John, Esq., F.L.S. 80 *Cambridge-terrace, Hyde-park.*
1812. Feb. 20.		Parry, Charles Henry, M.D. *Bath.*
1821. Feb. 15.		Parry, Sir William Edward, Knt. D.C.L. Capt. R.N. Hon. M.R.I.A. F.R.A.S. Acad. Imp. Sc. Petrop. Socius. 22 *New-street, Spring-gardens.*
1837. Feb. 23.	†	Partridge, Richard, Esq. 17 *New-street, Spring-gardens.*
1816. Mar. 7.		Pasley, Major-General Charles William, R.E. C.B. F.R.A.S. F.G.S. Inst. Reg. Sc. Paris. Corresp. *Board of Trade, Whitehall.*
1818. Jan. 29.		Peacock, Very Rev. George, D.D. Dean of Ely, F.G.S. F.R.A.S. *Deanery, Ely.*
1833. Dec. 5.		Pearson, Sir Edwin, K.H. M.A. 5 *Gloucester-terrace, Regent's-park.*

Date of Election.		
1819. July 1.		Pearson, Rev. William, LL.D. F.R.A.S. *South Kilworth, near Welford, Northamptonshire.*
1826. Mar. 9.		Pearson, Sir William, Knt. M.D. 16 *Hanover-square.*
1832. Feb. 2.		Pechell, Sir Samuel John Brooke, Bart. Capt. R.N. 27 *Hill-street, Berkeley-square.*
1822. Dec. 5.		Peel, Right Hon. Sir Robert, Bart. D.C.L. Trust. Brit. Mus. F.S.A. *Whitehall-gardens; and Drayton-Manor, Fazeley, Staffordshire.*
1835. April 2.	†	Pelly, Sir John Henry, Bart. *Trinity-house.*
1813. Feb. 11.		Pemberton, George, Esq. *Bainbridge Holme, Lurham; and* 11 *A, Grey-street, Manchester-square.*
1827. May 24.		Pendarves, Edward William Wynne, Esq., M.A. F.G.S. 36 *Eaton-place, Belgrave-square; and Pendarves, Truro, Cornwall.*
1824. Nov. 18.		Penn, Richard, Esq. 6 *Whitehall.*
1808. Jan. 28.		Pepys, William Hasledine, Esq., F.L.S. 22 *Poultry.*
1838. May 3.	†	Pereira, Jonathan, M.D. F.L.S. 47 *Finsbury-square.*
1807. Dec. 10.		Petit, Louis Hayes, Esq., M.A. F.S.A. F.L.S. F.G.S. F.R.A.S. M.R.S.L. 9 *New-square, Lincoln's-inn.*
1817. Mar. 6.		Petre, William Francis Henry, Lord. 3 *Mansfield-street; and Thorndon-hall, near Brentwood, Essex.*
1827. Feb. 1.	†	Pettigrew, Thomas Joseph, Esq., F.S.A. M.R.A.S. Univ. Gotting. Phil. Doct.—Acad. Reg. Divion. Socius. 8 *Saville-row.*
1826. Apr. 11.		Philip, Alexander Philip Wilson, M.D. Coll. Reg. Med. Socius. F.R.S.E.
1840. Feb. 13.	†	Phillimore, Joseph, LL.D. 15 *College, Doctors'-commons; and* 22 *Portman-street.*
1819. Jan. 29.		Phillipps, Sir Thomas, Bart. M.A. F.S.A. F.G.S. Hon. M.R.S.L. *Middle-hill, Worcestershire.*
1834. Dec. 18.		Phillips, Benjamin, Esq. 17 *Wimpole-street, Cavendish-square.*
1834. Apr. 10.	†	Phillips, John, Esq., Prof. F.G.S. *York.*
1822. Mar. 14.	*	Phillips, Richard, Esq., F.R.S.E. 6 *Craig's-court, Charing-cross; and Camberwell-green.*
1820. Apr. 20.		Phillips, Thomas, Esq., R.A. F.S.A. 8 *George-street, Hanover-square.*
1791. Mar. 10.		Pocock, Sir George, Bart. *Bransgore-house, Ringwood, Hampshire.*
1829. April 9.		Pole, William, Esq., M.A. 3 *Stone-buildings, Lincoln's-inn.*
1829. April 9.		Pollock, David, Esq., F.R.A.S. M.R.A.S. M.R.S.L. 20 *Montague-street, Russell-square; and* 3 *Pump-court, Temple.*
1816. Feb. 29.		Pollock, The Right Hon. Sir Frederick, Chief Baron of the Exchequer, K.H. M.A. F.S.A. F.G.S. *Queen-square-house, Guildford-street.*
1838. Jan. 18.	†	Porter, George Richardson, Esq., M.R.A.S. Instit. Reg. Sc. Paris. Corresp. *Board of Trade, Whitehall.*
1837. June 8.		Portlock, Joseph Ellison, Esq., Capt. R.E. F.G.S. *Cork.*
1824. May 13.		Powell, Rev. Baden, M.A. F.R.A.S. Savilian Professor of Geometry, Oxford. *Oxford.*
1842. Jan. 27.	†	Pratt, Samuel Peace, Esq., F.L.S. F.G.S. 55 *Lincoln's-inn-fields; and Bath.*
1827. Feb. 8.		Prichard, James Cowles, M.D. Hon. M.R.I.A. Instit. Reg. Sc. Paris. Corresp. *Bristol.*
1840. Feb. 6.	†	Pritchard, Rev. Charles, M.A. *Clapham.*
1819. Mar. 11.	*	Prout, William, M.D. Coll. Reg. Med. Socius. 40 *Sackville-street.*
1818. April 9.		Prudhoe, Algernon, Lord, F.S.A. President of the Royal Institution of Great Britain. *Whitehall-gardens; and Stanwick-park, Darlington, Yorkshire.*
1830. May 27.		Pusey, Philip, Esq. 35 *Grosvenor-square*; *and Pusey-house, near Faringdon, Berks.*

Date of Election.	
1844. Feb. 29.	† Quain, Richard, Esq. Professor of Anatomy, University-college, London. 23 *Keppel-street.*
1819. June 24.	Ramsbottom, John, Esq., M.P. 14 *Albany; and Grove-house, near Windsor.*
1814. Dec. 15.	Rashleigh, William, Esq., F.L.S. 3 *Cumberland-terrace, Regent's-park; and Menabilly-house, Foy, Cornwall.*
1837. Jan. 19.	† Rastrick, John Urpath, Esq. 46 *Eaton-square.*
1838. Feb. 8.	Reade, Rev. Joseph Bancroft, M.A. *Stone Vicarage, Aylesbury.*
1843. Feb. 2.	Rees, George Owen, M.D. 59 *Guildford-street, Russell-square.*
1817. June 12.	Reeves, John, Esq., F.L.S. F.R.A.S. *Clapham.*
1834. Feb. 6.	Reeves, John Russell, Esq., F.L.S. *Clapham.*
1839. Feb. 21.	† Reid, Lieut.-Colonel William, C.B. R.E. Governor of Bermuda.
1843. Feb. 23.	† Rendel, James Meadows, Esq. 34 *Great George-street, Westminster.*
1822. Mar. 21.	Rennie, George, Esq., Hon. M.R.I.A. 21 *Whitehall-place.*
1823. June 12.	Rennie, Sir John, Knt. 15 *Whitehall-place.*
1825. Feb. 24.	Richardson, John, M.D. F.L.S. Acad. Sc. Nat. Philad., Geogr. Paris. Corresp.—Socc. Hist. Nat. Montreal, Lit. et Phil. Quebec, Hist. Nat. Boston, Socius Honor. *Haslar-hospital, Gosport.*
1840. April 2.	† Richmond, Charles Gordon Lennox, Duke of, K.G. President of the Royal Agricultural Society. 51 *Portland-place; and Goodwood, near Petworth, Sussex.*
1820. Mar. 23.	Ricketts, Charles Milner, Esq., F.G.S. *Lima.*
1842. Jan. 13.	Riddell, Charles James Buchanan, Esq., Lieut. R.A. *Woolwich.*
1839. Apr. 25.	Rigg, Robert, Esq. *Greenford, Middlesex.*
1828. Apr. 17.	Ripon, Frederick John, Earl of. 4 *St. James's-square.*
1836. Feb. 11.	Robertson, Dr. Archibald. *Northampton.*
1796. Nov. 17.	Rogers, Samuel, Esq. F.S.A. 22 *St. James's-place.*
1839. Dec. 5.	Rogers, John, jun. Esq. *Vine-lodge, near Sevenoaks, Kent.*
1815. Mar. 16.	Roget, Peter Mark, M.D.—SECRETARY.—F.G.S. F.R.A.S. V.P.S.A. Coll. Reg. Med. Socius. 18 *Upper Bedford-place, Russell-square.*
1844. Feb. 1.	† Ronalds, Francis, Esq. *Chiswick.*
1831. June 9.	Ros, Hon. I. Frederick F. de, Capt. R.N. F.R.A.S. 116 *New Bond-street.*
1834. June 5.	Rose, Sir George, Knt. 4 *Hyde-park-gardens.*
1819. April 1.	Rosebery, Archibald John, Earl of, K.T. 139 *Piccadilly; and Dalmeney-park, Linlithgow.*
1822. June 13.	Ross, Capt. Daniell. *India.*
1828. Dec. 11.	Ross, Sir James Clark, Knt. Capt. R.N. D.C.L. F.L.S. F.R.A.S. Soc. Reg. Sc. Hafn. Socius. *Elliott-place, Blackheath.*
1131. Dec. 8.	Rosse, William, Earl of, F.R.A.S. *Birr-castle, King's-county, Ireland.*
1839. Dec. 12.	† Roupell, George Leith, M.D. 15 *Welbeck-street.*
1837. April 6.	† Royle, John Forbes, M.D. F.L.S. F.G.S. F.R.A.S. Professor of Materia Medica and Therapeutics, King's-college. 4 *Bulstrode-street, Manchester-square.*
1805. Jan. 31.	Rudge, Edward, Esq., F.S.A. F.L.S. F.H.S. F.R.G.S. 44 *Wimpole-street; and Abbey Manor-house, Evesham, Worcestershire.*
1821. June 7.	Russell, Jesse Watts, D.C.L. F.S.A. F.L.S. F.G.S. *Ilam-hall, Staffordshire.*
1818. Apr. 16.	Sabine, Lieut.-Colonel Edward, R.A. F.R.A.S. Corresp. Mem. National Inst. Washington U.S. Acadd. Imp. Sc. Petrop., Reg. Sc. Taur., Brux., Norv. Phil. et Œcon. Siles. Socius: Socc. Reg. Sc. Gotting., et Geogr. Paris., Corresp. *Athenæum; and Woolwich.*

Date of Election.	
1832. Dec. 6.	Sanford, Edward Ayshford, Esq. *Nynehead, Somerset.*
1833. Apr. 18.	† Saunders, Rev. Augustus Page, D.D. *Charterhouse-school.*
1822. June 27.	Sawbridge, Henry Barne, Esq.
1824. June 17.	Scoresby, Rev. William, D.D. F.R.S.E. Instit. Reg. Sc. Paris. Corresp. Vicar of Bradford, Yorkshire. *Bradford.*
1800. Jan. 16.	Scott, John Corse, Esq. *Edinburgh.*
1826. Dec. 7.	Scrope, George Poulett, Esq. F.G.S. 13 *Belgrave-square; and Castle Combe, Chippenham, Wiltshire.*
1824. Jan. 15.	† Scudamore, Sir Charles, Knt. M.D. 6 *Wimpole-street.*
1821. Feb. 1.	Sedgwick, Rev. Adam, M.A. Hon. M.R.I.A. F.G.S. F.R.A.S. Woodwardian Lecturer. *Cambridge.*
1831. Jan. 13.	Selkirk, Thomas James, Earl of. *St. Mary's Isle, Kirkcudbright.*
1841. June 17.	† Seymour, Edward James, M.D. Coll. Reg. Med. Socius. 13 *Charles-street, Berkeley-square.*
1840. May 7.	† Sharp, William, Esq, F.G.S. F.R.A.S. *Humber-bank-house, Hull.*
1839. May 9.	Sharpey, William, M.D. F.R.S.E. Professor of Anatomy in University-college. 35 *Gloucester-crescent, Regent's-park.*
1831. Apr. 21.	Shee, Sir Martin Archer, Knt. President of the Royal Academy. 32 *Cavendish-square.*
1830. April 1.	Sheepshanks, Rev. Richard, M.A. F.G.S. F.R.A.S. 14 *London road, Reading.*
1824. Mar. 11.	Shuckburg, Sir Francis, Bart. *Pavilion, Hans-place, Chelsea; and Shuckburg-park, Warwickshire.*
1841. Mar. 4.	† Sievier, Robert William, Esq. 12 *Henrietta-street, Cavendish-square.*
1813. Mar. 11.	Simmons, Richard, Esq., F.S.A. F.L.S. 3 *Cumberland-place, Regent's-park.*
1837. Apr. 20.	† Skey, Frederic Carpenter, Esq. 13 *Grosvenor-street.*
1820. Mar. 23.	Sleath, Rev. John, D.D. F.S.A. 4 *Hertford-street, May-fair.*
1841. June 10.	Smee, Alfred, Esq. 7 *Finsbury-circus.*
1824. May 14.	Smith, Lieut.-Col. Charles Hamilton, F.L.S. *Plymouth.*
1830. Dec. 23.	Smith, James, Esq., F.R.S.E. *Jordan-hill, near Glasgow.*
1837. June 1.	Smith, John T., Esq., Capt. Madras Engineers. *Madras.*
1840. Jan. 9.	† Smith, John Pye, D.D. *Homerton, Middlesex.*
1803. May 10.	Smith, John Spenser, Esq, F.S.A. *Caen, Normandy.*
1819. Nov. 25.	Smith, Joseph, Esq., F.L.S. 1 *Field-court, Gray's-inn.*
1806. Feb. 13.	Smith, Sir William, Knt.
1841. Nov. 18.	† Smith, Sir J. M. Frederic, Lieut.-Colonel, R.E. *Chatham.*
1826. June 15.	Smyth, William Henry, Esq., Capt. R.N. K.S.F. D.C.L. Hon. M.R.I.A. F.S.A. For. Sec. R.A.S.—Instit. Reg. Sc. Paris. Corresp., Acadd. Sc. Neap., Panorm. et Flor., Socius, Corresp. Mem. National Inst. Washington and Naval Lyceum of New York. 2 *Cheyne-walk, Chelsea.*
1843. Jan. 19.	† Solly, Edward, jun., Esq., F.L.S. 38 *Bedford-row.*
1807. May 7.	* Solly, Richard Horsman, Esq., M.A. F.S.A. F.L.S. F.G.S. 48 *Great Ormond-street.*
1812. May 14.	Solly, Samuel, Esq., F.L.S. 48 *Upper Gower-street; and Poole, Dorset.*
1837. Jan. 19.	† Solly, Samuel, Esq. 1 *St. Helen's-place, Bishopsgate-street.*
1823. May 29.	Solly, Samuel Reynolds, Esq., M.A. F.S.A. F.G.S. *Surge-hill, King's Langley, Herts.*
1797. Mar. 9.	Somerset, Edward Adolphus, Duke of, K.G. D.C.L. F.S.A. F.L.S. *Park-lane.*
1817. Dec. 11.	Somerville, William, M.D. F.R.S.E. F.L.S. F.G.S. *Rome.*

Date of Election.	
1821. Feb. 15.	South, Sir James, Knt. F.R.S.E. Hon. M.R.I.A. F.L.S. F.R.A.S. Acad. Imp. Sc. Petrop. Socius.—Acad. Reg. Sc. Brux. Corresp. *The Observatory, Camden-hill, Kensington.*
1825. Apr. 14.	Southey, Henry Herbert, M.D. Coll. Reg. Med. Socius. 1 *Harley-street.*
1834. Apr. 10.	† Spence, William, Esq., F.L.S. Soc. Linn. Holm. Soc. 18 *Lower Seymour-street.*
1844. Feb. 1.	† Stanford, John Frederick, Esq., M.A. *Foley-house, Portland-place.*
1807. Jan. 8.	* Stanhope, Philip Henry, Earl. 20 *Charles-street, Berkeley-sq.; and Chevening-place, Kent.*
1816. June 27.	Stanhope, John Spencer, Esq.
1830. Mar. 11.	Stanley, Edward, Esq. 23 *A, Brook-street.*
1790. Apr. 29.	Stanley, John Thomas, Lord, F.S.A. 40 *Dover-street, Piccadilly.*
1842. Mar. 3.	† Stanley, Owen, Esq., Capt. R.N.
1803. Apr. 28.	Staunton, Sir George Thomas, Bart. D.C.L. M.P. F.S.A. F.L.S. 17 *Devonshire-street, Portland-place.*
1832. April 5.	† Stephens, Archibald John, Esq., M.A. 61 *Chancery-lane; and* 43 *Torrington-square.*
1829. Jan. 15.	Steuart, John Robert, Esq., M.R.A.S. 56 *North Frederick-street, Edinburgh.*
1811. Nov. 21.	Stevenson, William Ford, Esq., F.S.A. *Grand-rue, Passy, near Paris.*
1838. May 3.	Stirling, Edward Hamilton, Esq. *Calcutta.*
1821. Jan. 18.	Stokes, Charles, Esq., F.S.A. F.L.S. F.G.S. F.R.A.S. 4 *Verulam-buildings, Gray's-inn.*
1823. Nov. 27.	Storey, Anthony Mervin Reeve, Esq., M.A. 86 *Jermyn-street; and Glanusk, Brecon.*
1810. June 7.	Stracey, Sir Edward, Bart. LL.D. *Rackheath-hall, Norfolk.*
1825. Feb. 3.	Strangford, Percy Clinton Sydney, Viscount, G.C.B. G.C.H. D.C.L. F.S.A. 68 *Harley-street.*
1821. Mar. 8.	Strangways, Hon. William Thomas Horner Fox. 31 *Old Burlington-street; and Abbotsbury, Dorsetshire.*
1832. June 7.	† Stratford, William Samuel, Esq., Lieut. R.N. F.R.A.S. Superintendent of the Nautical Almanac. 6 *Notting-hill-square, Kensington.*
1796. Nov. 17.	Sumner, George Holme, Esq., F.S.A. *Hatchlands, Guildford, Surrey.*
1828. Mar. 13.	Sutherland, Alexander Robert, M.D. Coll. Reg. Med. Socius, F.G.S. 1 *Parliament-street; and Torquay.*
1820. Dec. 14.	Swainson, William, Esq., F.L.S. Soc. Hist. Nov.-Ebor. Socius.—Soc. Hist. Nat. Paris. Corresp. *New Zealand.*
1839. Mar. 14.	† Swanston, Clement Tudway, Esq., F.S.A. 51 *Chancery-lane.*
1818. Feb. 26.	Swinburne, Sir John Edward, Bart. F.S.A. 18 *Grosvenor-place.*
1834. Feb. 6.	† Sykes, Lieut.-Colonel William Henry, Hon. M.R.I.A. F.G.S. M.R.A.S. 47 *Albion-street, Hyde-park.*
1839. Apr. 25.	† Sylvester, James Joseph, Esq., M.A. 4 *Park-street, Grosvenor-square.*
1835. June 4.	† Symonds, Sir William, K.H. Capt. R.N. 4 *Somerset-place.*
1813. May 6.	Talbot, Charles Chetwynd, Earl, K.P. F.S.A. *Ingestrie-hall, near Stafford; and* 10 *Great George-street.*
1831. Mar. 17.	Talbot, Christopher Rice Mansel, Esq. *Margam, Glamorganshire.*
1831. Mar. 17.	Talbot, William Henry Fox, Esq., F.L.S. 31 *Sackville-street; and Lacock-abbey, near Chippenham.*
1835. Feb. 5.	† Tattam, Rev. Henry, D.D. M.A. M.R.S.L. *Bedford.*
1825. May 5.	Taylor, John, Esq., Treas. G.S. F.L.S. *Sheffield-house, Church-street, Kensington.*
1842. Feb. 10.	Taylor, Thos. Glanville, Esq., F.R.A.S. Astronomer to the East India Company. *Madras.*

Date of Election.	
1836. Jan. 21.	† Taylor, Rev. William. 77 *Westbourne-terrace, Hyde-park.*
1834. June 5.	Teignmouth, Charles John, Lord, D.C.L. 19 *Portland-place.*
1829. Feb. 19.	Tennyson d'Eyncourt, Right Hon. Charles, F.S.A. 5 *Albemarle-street.*
1833. Dec. 5.	Terry, Charles, Esq., F.S.A.
1806. Jan. 16.	Thomas, Honoratus Leigh, Esq. *Torquay.*
1828. Nov. 20.	Thompson, Lieut.-Colonel Thomas Perronet, M.A. *Eliot-vale, Blackheath.*
1821. Dec. 20.	Thomson, James, Esq., F.L.S. *Primrose, near Clitheroe.*
1824. June 3.	Thomson, John, M.D. F.R.S.E. *Edinburgh.*
1811. Mar. 28.	Thomson, Thomas, M.D., Regius Professor of Chemistry, Glasgow, Hon. M.R.I.A. F.R.S.E. F.L.S. F.G.S. *Glasgow.*
1810. June 7.	Thornton, Right Hon. Edward, G.C.B. *Wembury house, Plymouth.*
1834. Apr. 10.	† Thornton, Henry Sykes, Esq. M.A. *Battersea-rise, Surrey.*
1839. May 30.	† Thorp, The Venerable Charles, D.D. Archdeacon of Durham and Warden of the University of Durham. *Durham.*
1841. Feb. 25.	† Tierney, Rev. Mark Aloysius. *Arundel, Sussex.*
1835. April 2.	Tite, William, Esq., F.S.A. 25 *Upper Bedford-place.*
1838. Feb. 8.	† Todd, Robert Bently, M.D. Coll. Reg. Med. Socius, Professor of Physiology and General Anatomy, King's-college, London. 26 *Parliament-street.*
1821. Mar. 22.	Tooke, Thomas, Esq. 31 *Spring-gardens.*
1818. Mar. 12.	Tooke, William, Esq., M.R.S.L. 12 *Russell-square.*
1818. Dec. 17.	* Torrens, Lieut.-Colonel Robert. *Reform Club, Pall-mall.*
1812. Dec. 17.	* Towneley, Peregrine Edward, Esq., Trust. Brit. Mus. F.S.A. 7 *Park-street, Westminster; and Towneley-hall, near Burnley, Lancashire.*
1842. Nov. 17.	Towneley, Charles, Esq. 3 *Tilnay-street, Park-lane.*
1822. Nov. 7.	Townley, George, Esq. 5 *L, Albany.*
1842. Mar. 10.	Toynbee, Joseph, Esq. 12 *Argyll-place.*
1823. May 29.	Traherne, Rev. John Montgomery, M.A. F.S.A. F.L.S. F.G.S. *St. Hilary, near Cowbridge, Glamorganshire.*
1815. Nov. 16.	Travers, Benjamin, Esq. 12 *Bruton-street.*
1822. Nov. 14.	Tulk, Charles Augustus, Esq., F.S.A. *Totteridge-park, Herts.*
1843. May 18.	Tulloch, James, Esq., F.S.A. F.L.S. 16 *Montague-place, Bedford-square.*
1835. Feb. 5.	† Tupper, Martin, Esq., F.G.S. 5 *New Burlington-street.*
1817. June 5.	Turnbull, Peter Evans, Esq., F.S.A.
1831. Mar. 17.	Turnbull, Rev. Thomas Smith, M.A. F.G.S. *Caius-college, Cambridge.*
1821. May 24.	Turner, Charles Hampden, Esq., F.L.S. F.G.S. 15 *Bruton-street; and Rook's-nest-park, Godstone, Surrey.*
1802. Dec. 9.	Turner, Dawson, Esq., Hon. M.R.I.A. F.S.A. F.L.S. M.R.S.L. Acadd. Cæs. Nat. Cur. et Reg. Sc. Holm. Socius. *Athenæum; and Yarmouth.*
1815. Dec. 21.	Turner, Samuel, Esq. *Liverpool.*
1839. May 9.	† Turnor, Rev. Charles, M.A. F.S.A. F.R.A.S. *Cheltenham.*
1838. April 5.	† Tuson, Edward William, Esq., F.L.S. 10 *Russell-place, Fitzroy-square.*
1838. Feb. 8.	† Tweedie, Alexander, M.D. Coll. Reg. Med. Socius. 30 *Montague-place, Bedford-square.*
1834. June 5.	Twining, Richard, Esq. 18 *Bedford-place, Russell-square.*
1838. Mar. 15.	† Twiss, Travers, Esq., D.C.L. F.G.S. Professor of Political Economy in the University of Oxford. 5 *B, Albany, Piccadilly.*

Date of Election.		
1820. Apr. 13.		Tylden, Lieut.-Colonel Sir John Maxwell, Knt. *Milsted, Kent.*
1821. Dec. 13.		Ure, Andrew, M.D. F.R.A.S. 13 *Charlotte-street, Bedford-square.*
1813. June 24.		Vaughan, William, Esq. 70 *Fenchurch-street.*
1830. May 6.		Vetch, Capt. James, R.E. F.G.S. Corresp. Mem. Natt. Inst. Washington, U.S. 13 *Bosworth-grove, Islington.*
1823. Jan. 9.		Vivian, John Henry, Esq., F.G.S. 24 *St. James's-place; and Swansea, Glamorganshire.*
1826. June 8.		Vyvyan, Sir Richard Rawlinson, Bart. *Trelowarren, Cornwall.*
1828. Apr. 17.		Walker, James, Esq., F.R.S.E. President of the Institution of Civil Engineers. 23 *Great George-street, Westminster.*
1831. Mar. 3.		Walker, Rev. Robert, M.A. Reader in Experimental Philosophy in the University of Oxford. *Wadham-college, Oxford.*
1830. April 1.		Wall, Charles Baring, Esq., M.A. F.S.A. M.R.S.L. 44 *Berkeley-square; and Normancourt, near Stockbridge, Hampshire.*
1829. Mar. 12.		Wallich, Nathaniel, M. et Ph. D. F.R.S.E. F.L.S. F.G.S. M.R.A.S. Instit. Reg. Sc. Paris., et Acad. Reg. Sc. Berolin., Corresp.—Soc. Reg. Sc. Hafn. Socius. *Calcutta.*
1819. Nov. 11.		Walter, Rev. Henry, B.D. *Hasilbury Brian, Dorsetshire.*
1837. May 25.	†	Walton, Rev. William, M.A. *Allenheads, Northumberland.*
1809. Feb. 16.		Warburton, Henry, Esq., M.A. President of the Geological Society. 45 *Cadogan-place, Sloane-street.*
1834. Apr. 10.		Warburton, John, M.D. Coll. Reg. Med. Socius. 23 *Park-crescent, Regent's-park.*
1817. May 1.		Warre, John Ashley, Esq. 54 *Lowndes-square, Sloane-street.*
1830. Dec. 9.		Warren, Rev. John, M.A. *Graveley, Cambridgeshire.*
1835. April 2.	†	Warren, Samuel, Esq. *Inner Temple; and 35 Woburn place.*
1815. June 8.		Warrender, Right Hon. Sir George, Bart. F.R.S.E.
1834. Feb. 6.		Waterhouse, John, jun. Esq. *Halifax, Yorkshire.*
1818. Nov. 12.		Watson, Sir Frederick Beilby, K.C.H. F.S.A. 4 *Albany-terrace, New-road.*
1820. Dec. 7.		Watt, James, Esq. *Aston-hall, Birmingham.*
1827. May 24.	†	Wavell, Major-General Arthur Goodall, K.F. K.C.S. *Little Lombone, near Stockbridge, Hants.*
1826. Mar. 9.		Weaver, Thomas, Esq., M.R.I.A. F.G.S. 16 *Stafford-row, Pimlico; and Woodlands, Wrington.*
1822. Mar. 21.		Webb, Frederick, Esq., F.S.A. *Langham-place, Brighton.*
1844. Mar. 7.		Webster, John, M.D. Coll. Reg. Med. Socius. 24 *Brook-street, Grosvenor-square.*
1837. May 25.	†	Westmacott, Richard, Esq., F.G.S. 21 *Wilton-place, Belgrave-square.*
1841. June 10.	†	Westminster, K.G. Robert Grosvenor, Marquis of. 33 *Upper Grosvenor-street; and Eaton-park, Chester.*
1824. Dec. 16.		Wetherell, Sir Charles, Knt. D.C.L. 5 *Stone-buildings, Lincoln's-inn.*
1814. June 9.		Weyland, John, Esq. 52 *Charles-street, Berkeley-square; and Woodrising-hall, Norfolk.*
1840. Jan. 9.		Whatman, James, jun. Esq. *Vinters, near Maidstone, Kent.*
1836. Jan. 21.	†	Wheatstone, Charles, Esq. Professor of Experimental Philosophy, King's-college, London, Instit. Reg. Sc. Paris. Corresp. 20 *Conduit-street.*
1820. Apr. 13.		Whewell, Rev. William, B.D. Hon. M.R.I.A. F.S.A. F.G.S. F.R.A.S. Master of Trinity-college, Cambridge. *Lodge, Cambridge.*
1837. Apr. 13.	†	White, William Archibald Armstrong, Esq., F.S.A. 14 *College-street, Westminster.*

Date of Election.		
1842. Dec. 22.	†	Widdrington, Samuel E., Esq., Capt. R.N. *Carlton-hall, near Darlington; and Newton-hall, Northumberland.*
1835. April 2.	†	Wigram, Hon. Sir James, Knt. M.A. F.S.A. 68 *Portland-place.*
1821. Mar. 8.		Wilbraham, George, Esq. *Delamere-house, Northwich, Cheshire.*
1834. Dec. 18.		Wilkinson, Sir John Gardner, Knt. 34 *Conduit-street.*
1835. April 2.	†	Williams, Charles James Blasius, M.D. Coll. Reg. Med. Socius, Professor of Physic in University-college, London. 7 *Holles-street, Cavendish-square.*
1828. Mar. 6.		Williams, John, jun. Esq., F.L.S. *Scorrier-house, near Redruth, Cornwall.*
1830. Apr. 22.		Willis, Rev. Robert, M.A. F.G.S. Jacksonian Professor of Natural and Experimental Philosophy, *Cambridge.*
1812. May 7.		Wilmot, Sir John Eardley Eardley, Bart. D.C.L. F.S.A. F.L.S. Governor of Van Diemen's Land.
1838. Mar. 1.	†	Wilson, Alexander, Esq. 34 *Bryanston-square.*
1801. Apr. 16.		Wilson, Sir Giffin, Knt. 2 *Stratford-place; and Woburn-house, Beaconsfield, Buckinghamshire.*
1796. Apr. 28.		Wilson, Glocester, Esq. *Hastings.*
1834. Apr. 10.		Wilson, Horace Hayman, Esq., M.A. M.R.A.S. Boden Professor of Sanscrit in the University of Oxford. 14 *Upper Wimpole-street.*
1831. Feb. 24.		Wilson, Sir Isaac, Knt. M.D. F.R.S.E. *High-street, Fareham, Hants.*
1834. June 5.		Witt, George, M.D. *Bedford.*
1813. Feb. 25.		Wix, Rev. Samuel, M.A. F.S.A. *Rectory-house, St. Bartholomew's the Less.*
1810. July 12.		Wix, William, Esq. *Tunbridge-wells, Kent.*
1829. Feb. 26.		Wollaston, Alexander Luard, Esq., M.B. F.R.A.S.
1812. Dec. 24.	*	Wood, William, Esq., F.L.S. *Ruislip, near Uxbridge.*
1836. Dec. 22.	†	Wood, William Page, Esq. 3 *Stone-buildings, Lincoln's-inn.*
1841. May 20.	†	Wood, Lieut.-Colonel Thomas. 4 *Cavendish-square.*
1841. Apr. 29.	†	Woodward, Charles, Esq. 10 *Compton-terrace, Islington.*
1829. June 4.		Wortley, Hon. John Stuart, B.A. 15 *Curzon-street, May-fair.*
1843. June 1.	†	Wright, Rev. John, M.A. F.S.A. F.R.A.S. M.R.S.L. 67 *Westbourne-terrace, Hyde-park-gardens.*
1841. Apr. 29.	†	Wrottesley, John, Lord. *Wrottesley-hall, Wolverhampton.*
1839. Jan. 31.	†	Yates, James, Esq., M.A. F.L.S. F.G.S. *York.*

FOREIGN MEMBERS.

Louis Agassiz	*Neufchatel.*	1838.
François-Jean-Dominique Arago	*Paris.*	1818.
Elie de Beaumont	*Paris.*	1835.
Antoine César Becquerel	*Paris.*	1837.
Jens Jacob Berzelius	*Stockholm.*	1813.
Friedrich Wilhelm Bessel	*Königsberg.*	1825.
Jean-Baptiste Biot	*Paris.*	1815.
H. M. Ducrotay de Blainville	*Paris.*	1832.
Alexandre Brongniart	*Paris.*	1815.
Leopold von Buch	*Berlin.*	1828.
Francesco Carlini	*Milan.*	1832.
Le comte de Cassini	*Paris.*	1789.
Augustin-Louis Cauchy	*Paris.*	1832.
Michel-Eugène Chevreul	*Paris.*	1826.
Le baron de Damoiseau	*Paris.*	1832.
Jean-Baptiste Dumas	*Paris.*	1840.
Christian Gottfried Ehrenberg	*Berlin.*	1837.
Johann Friedrich Encke	*Berlin.*	1825.
Paul Erman	*Berlin.*	1827.
P. Flourens	*Paris.*	1835.
Karl Friedrich Gauss	*Göttingen.*	1804.
P. A. Hansen	*Seeberg.*	1835.
Christopher Hansteen	*Christiana.*	1839.
Baron Alexander von Humboldt	*Berlin.*	1815.
C. G. J. Jacobi	*Königsberg.*	1838.
Admiral A. J. von Krusenstern.	*St. Petersburgh.*	1837.
Justus Liebig	*Giessen.*	1840.
Baron von Lindenau	*Dresden.*	1833.
Henry Frederic Link	*Berlin.*	1842.
Joseph-Louis Gay-Lussac	*Paris.*	1815.
Carl. Fried. Philip von Martius	*Munich.*	1838.
Macédonie Melloni	*Parma.*	1839.
C. F. Brisseau Mirbel	*Paris.*	1837.
Eilert Mitscherlich	*Berlin.*	1828.
Johann Müller	*Berlin.*	1840.
Jens Christian Oersted	*Copenhagen.*	1821.
George Simon Ohm	*Nuremberg.*	1842.
Giovanni Plana	*Turin.*	1827.
Jean Victor Poncelet	*Paris.*	1842.
G. de Pontécoulant	*Paris.*	1833.
Lambert Adolphe Jacques Quetelet	*Brussels.*	1839.
Henry Rose	*Berlin.*	1842.
O. A. Rosenberger	*Halle.*	1835.
Théodore de Saussure	*Geneva.*	1826.
Heinrich Christian Schumacher	*Altona.*	1821.
Friedrich Georg Wilhelm Struve	*Dorpat.*	1827.
Jacques Charles François Sturm.	*Paris.*	1840.
Le baron Thénard	*Paris.*	1824.
Friedrich Tiedemann	*Heidelberg.*	1832.

FELLOWS DECEASED SINCE THE LAST ANNIVERSARY (Nov. 30, 1843).

On the Home List.

William Allen, Esq.
Francis Baily, Esq.
Admiral Barlow.
Rev. Henry Card.
James Carson, M.D.
William Stanley Clarke, Esq.
Rev. Daniel Cresswell.
John Dalton, D.C.L.
Rev. James Farquharson.
John Lewis Guillemard, Esq.
Sir Henry Halford, Bart.
Captain Basil Hall, R.N.
Thomas Henderson, Esq.
Rev. Robert Hodgson.
Thomas Charles Hope, M.D.
James Macartney, M.D.
John Grant Malcolmson, M.D.
John Thomas Mayne, Esq.
Right Hon. Sir Gore Ouseley, Bart.
Charles Savill Onley, Esq.
Henry Robinson Palmer, Esq.
Rev. John Barlow Seale.
John Smirnove, Esq.
William Speer, Esq.
George Frederick Stratton, Esq.
Robert Stearne Tighe, Esq.

Ceased to be a Fellow in default of his Annual Payment.

Lieut. H. A. Ormsby.

FELLOWS ADMITTED SINCE THE LAST ANNIVERSARY (Nov. 30, 1843).

On the Foreign List.

1844. June 13. His Majesty Frederick, King of Saxony.

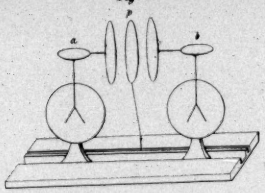
On the Home List.

Date of Election.	
1844. Apr. 18.	Allen, William, Esq., Capt. R.N.
1844. Jan. 11.	Ansted, David Thomas, Esq.
1844. June 6.	Billing, Archibald, M.D.
1844. May 9.	Bishop, John, Esq.
1844. Feb. 1.	Bury, Edward, Esq.
1844. Feb. 1.	Carpenter, William Benj., Esq., M.D.
1843. Dec. 7.	Crozier, Francis Rawdon Moira, Capt. R.N.
1844. Feb. 29.	Crum, Walter, Esq.
1844. Apr. 18.	Haddington, Right Hon. Earl.
1844. Apr. 18.	Hargreave, Charles James, Esq.
1843. Dec. 7.	Hood, Charles, Esq.
1844. Feb. 29.	Hyett, William Henry, Esq.
1844. Mar. 21.	Jones, Thomas Rymer, Esq.
1844. Feb. 29.	Kerigan, Thomas, Esq.
1844. May 16.	Larcom, Thomas Aiskew, Esq., Capt. R.E.
1844. Feb. 29.	Quain, Richard, Esq.
1844. Feb. 1.	Ronalds, Francis, Esq.
1844. Feb. 1.	Stanford, John Frederick, Esq.
1844. Mar. 7.	Webster, John, M.D.

PRINTED BY RICHARD AND JOHN E. TAYLOR,
RED LION COURT, FLEET STREET.

FRANKLIN INSTITUTE LIBRARY

Fig. 4.



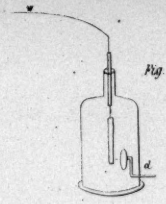


Fig. 5.

Fig. 2.

Fig. 1.

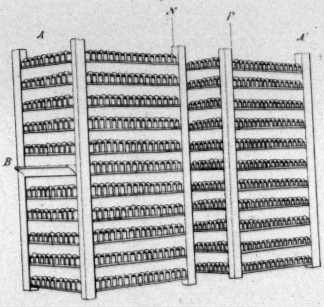


Fig. 3.

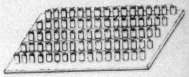


Fig. 6.

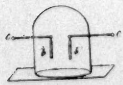


Fig. 7.

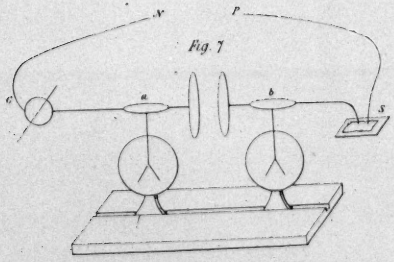
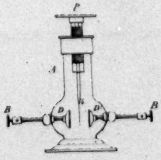


Fig. 8.



J. Basire, lithe.

Fig: 1.

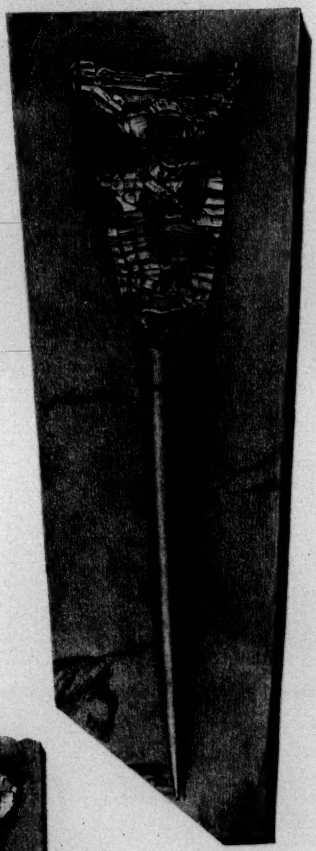


Fig: 2.

Fig: 3.

Fig: 4.

Fig: 5.

Fig: 6.

Fig: 7.

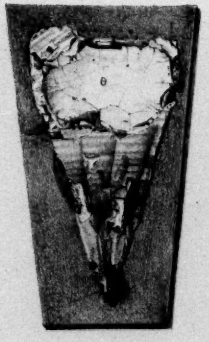


Fig: 8.

J. Basire. Sculp.

J. Basire, Sculp.

Fig. 2.

Fig. 1

J. Basire, Sculp.

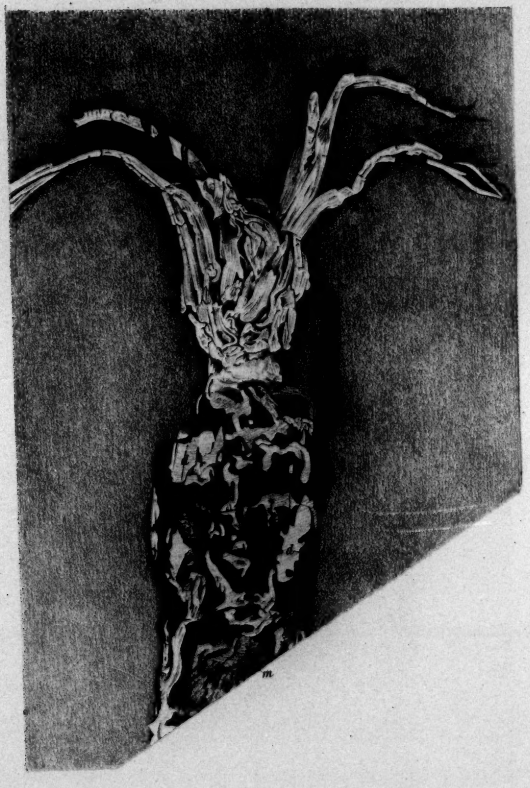

m.

Fig: 1.

Fig: 3.

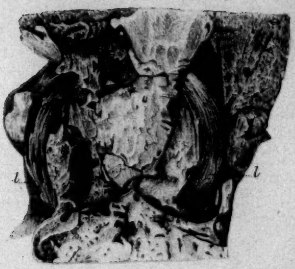
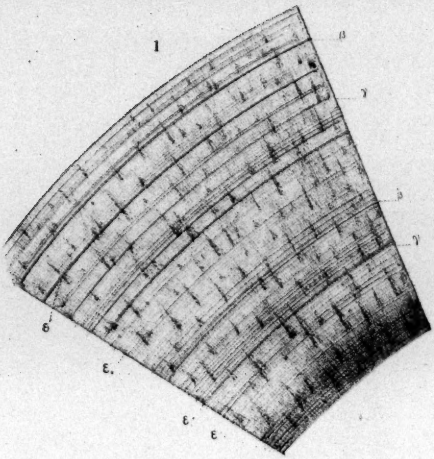
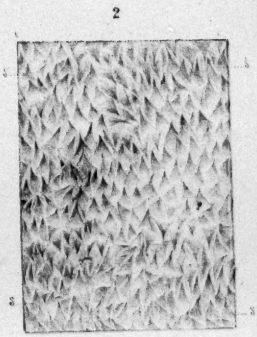
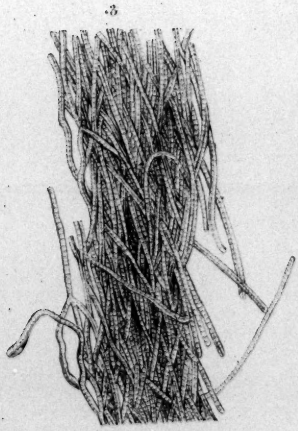
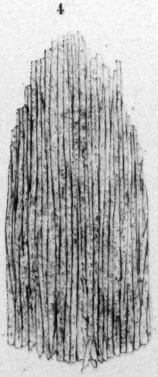


Fig: 2.





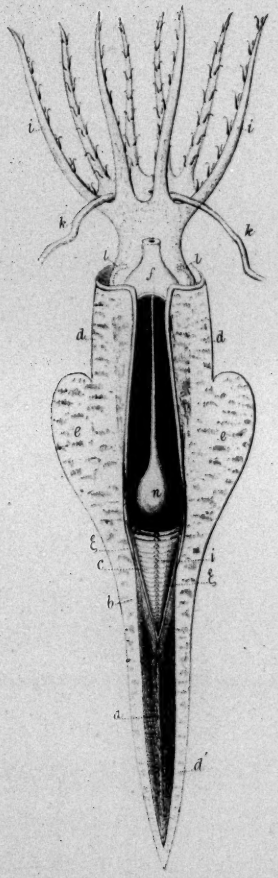




Lens Aldous, del. et Zinc.

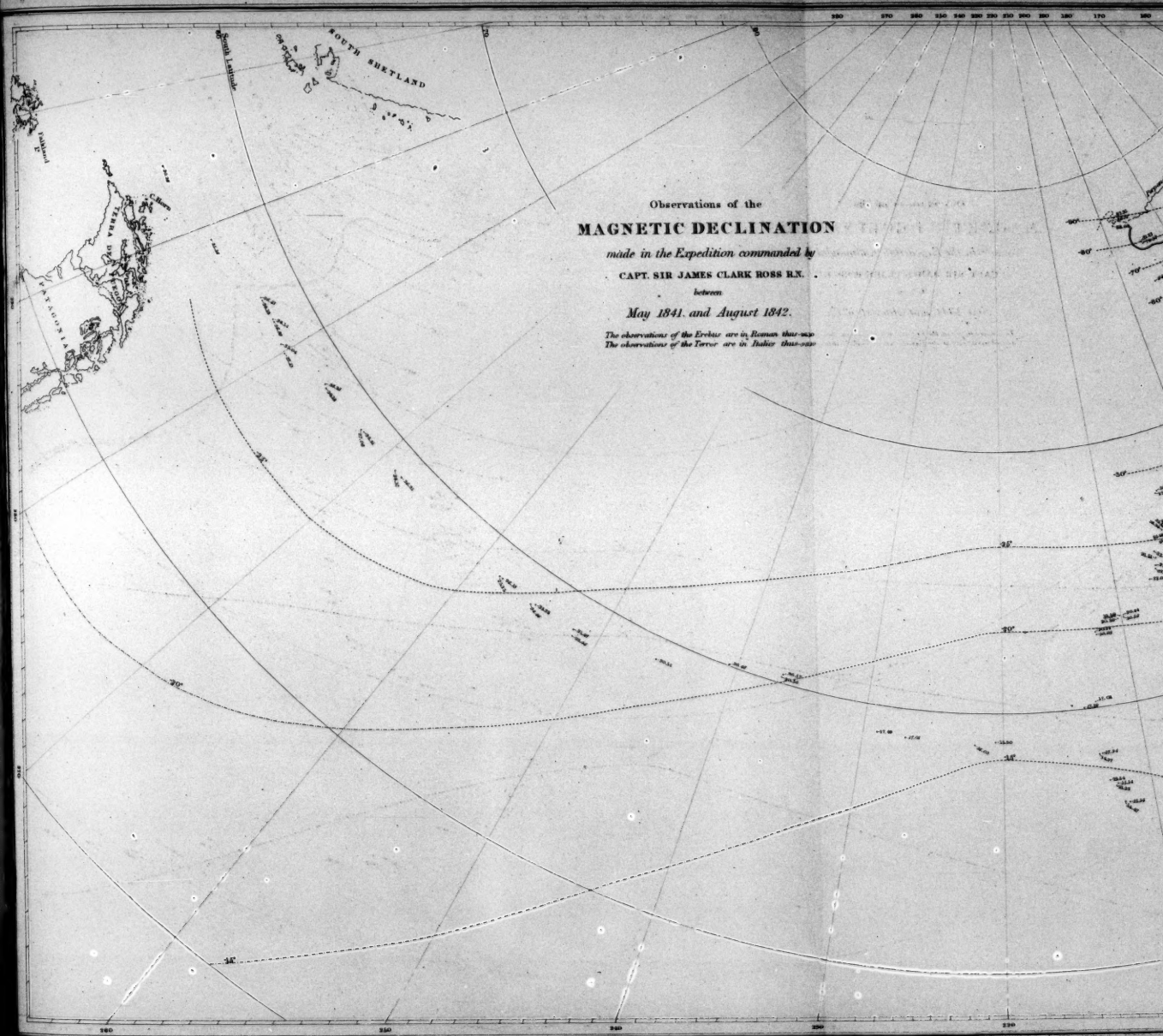
J. Pasure, Zincog.

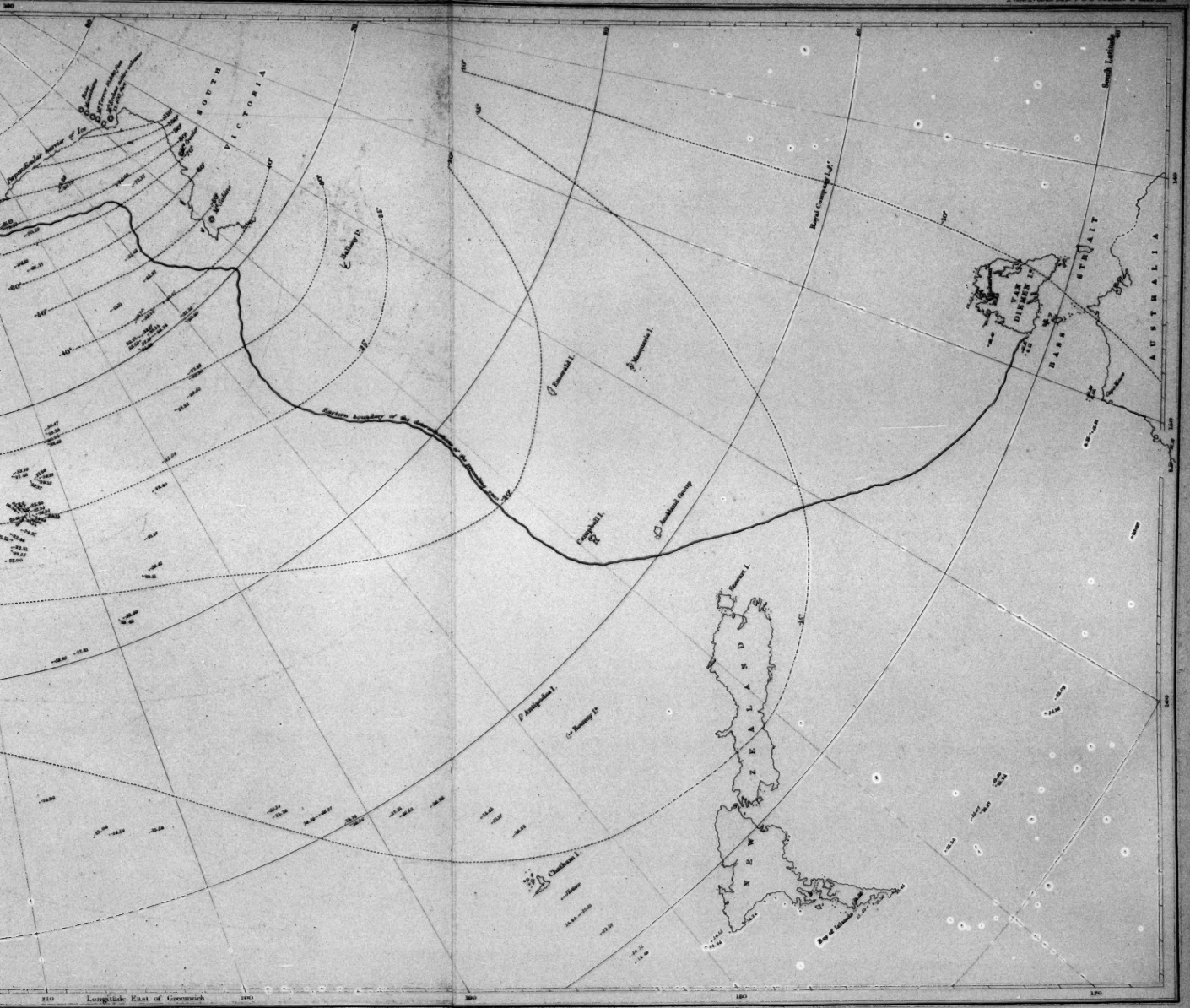
Microscopic structure of the guard and Muscular fibre.

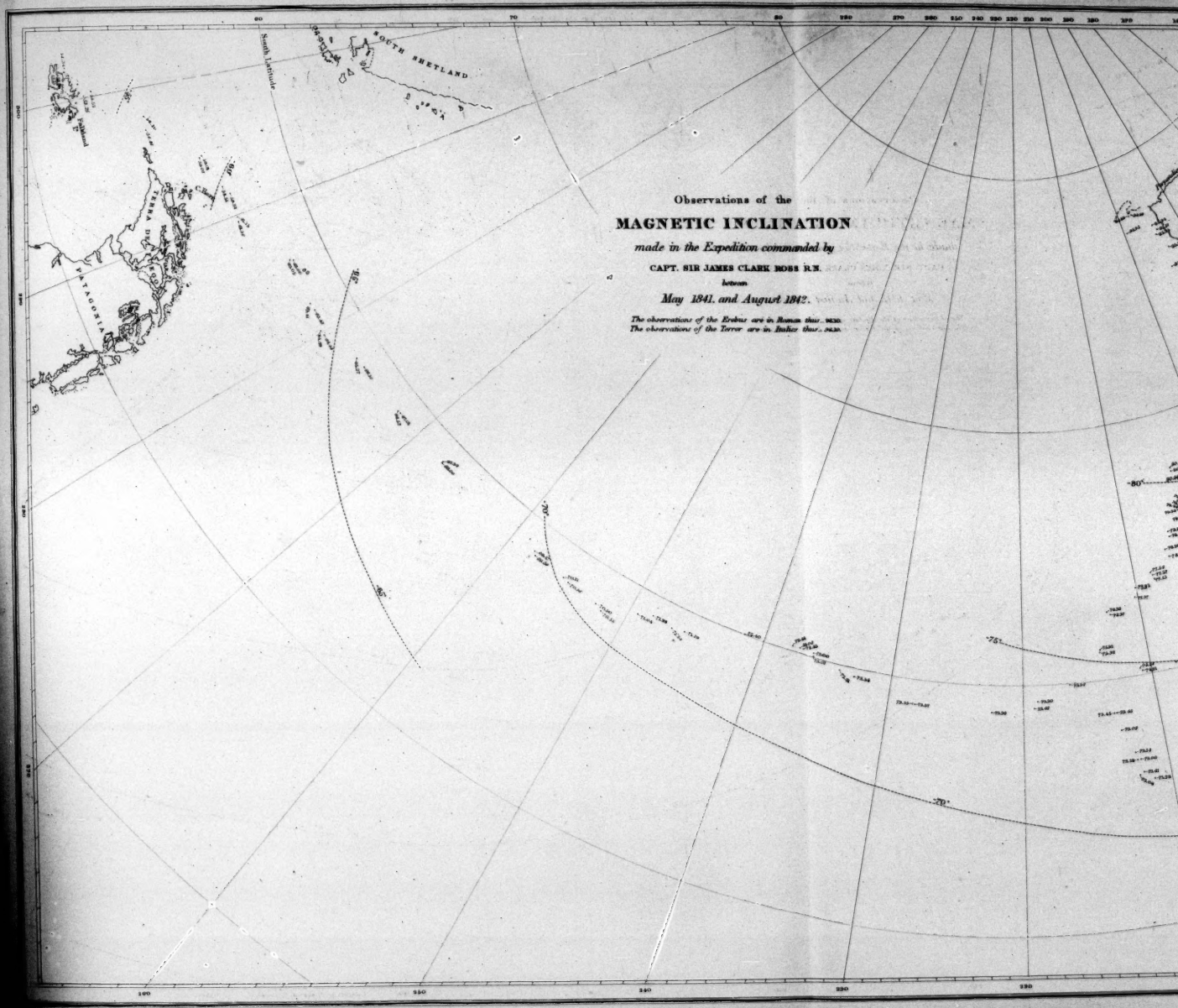


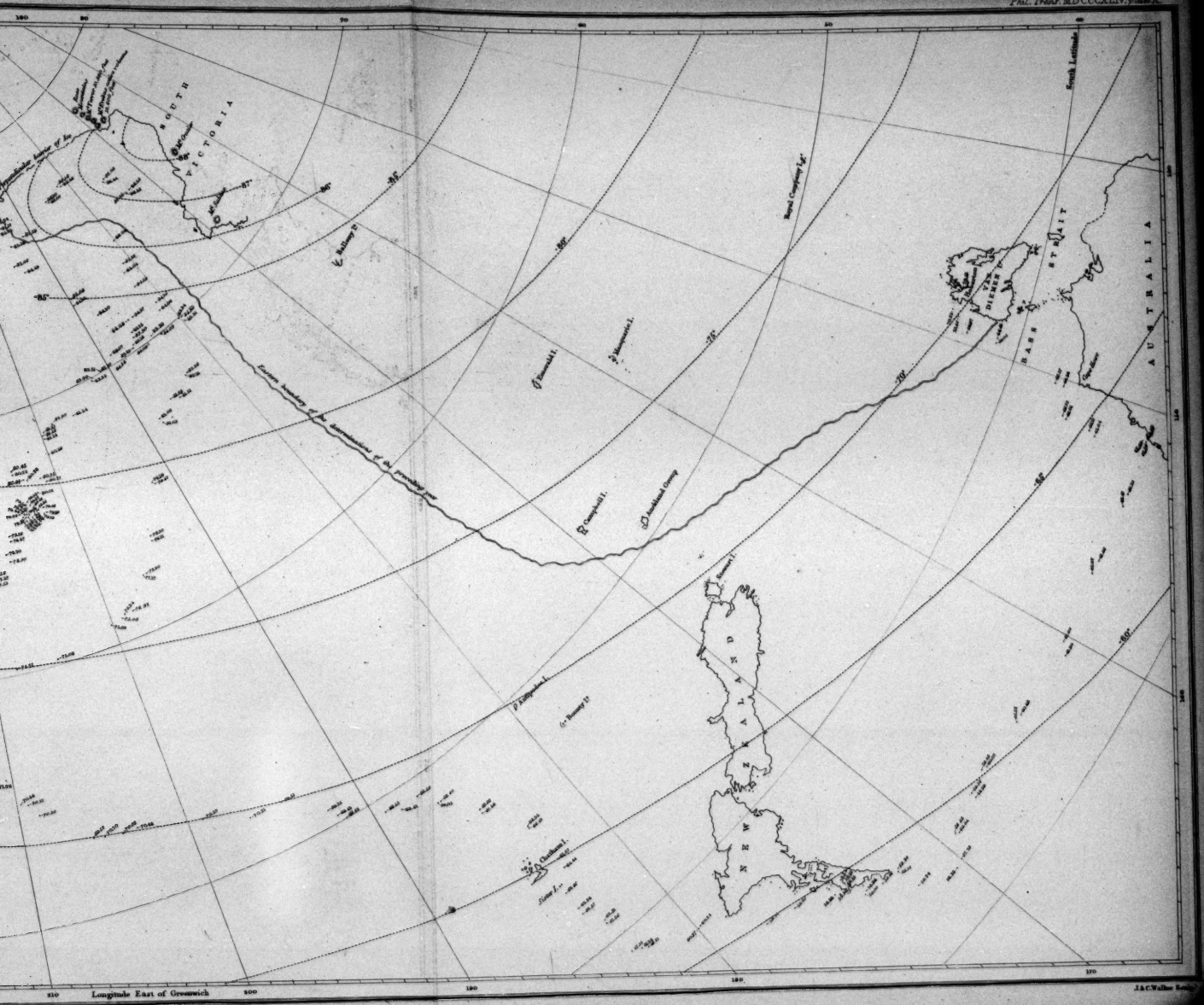
Belemnite restored

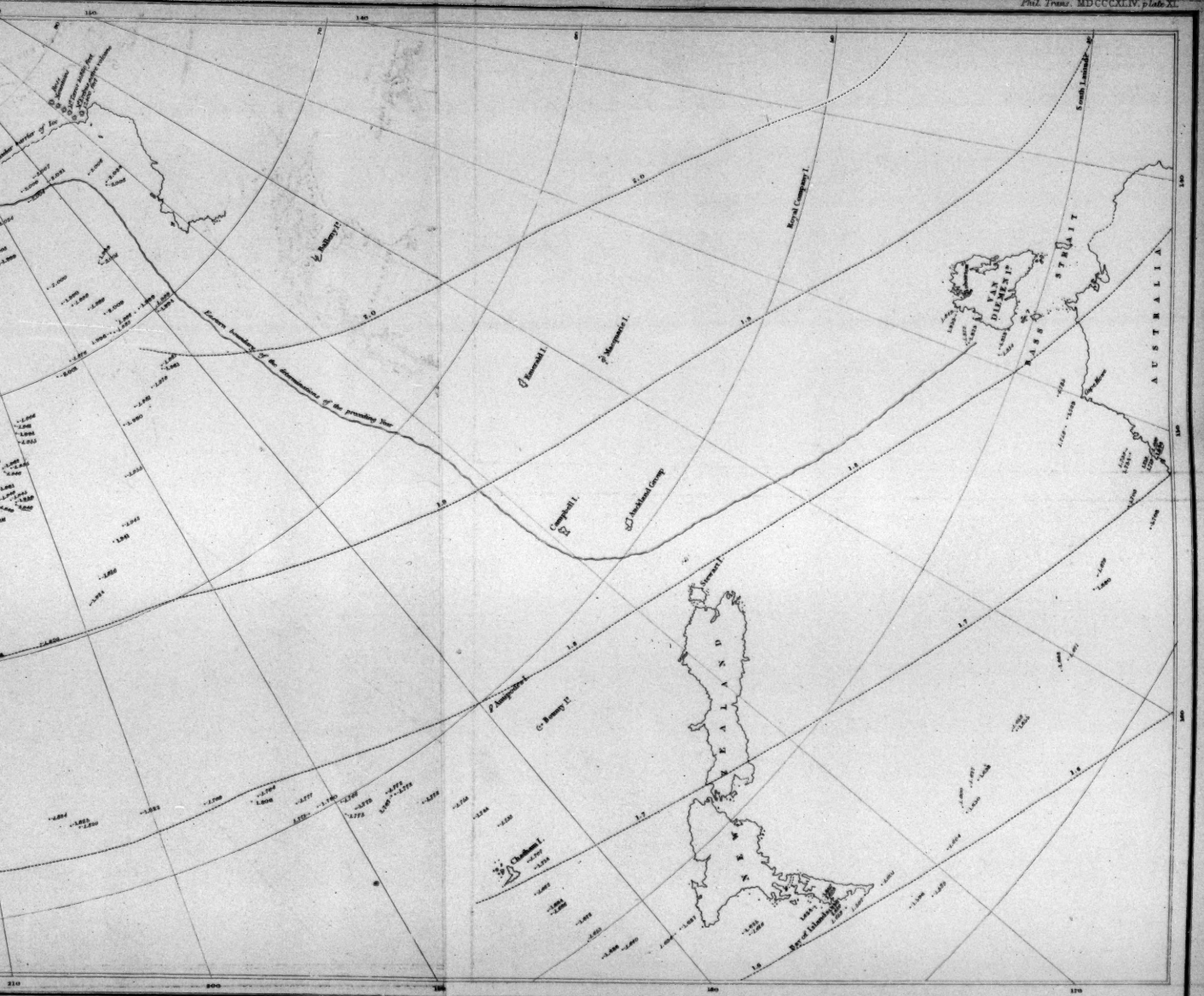
J. Basire. Sculp.


Observations of the
MAGNETIC DECLINATION
made in the Expedition commanded by
CAPT. SIR JAMES CLARK ROSS R.N.
between
May 1841. and August 1842.
The observations of the Erebus are in Roman thus-xxx
The observations of the Terror are in Italics thus-xxx
SOUTH SHETLAND
South Latitude
Falkland Is.
VICTORIA LAND
GRAHAM LAND

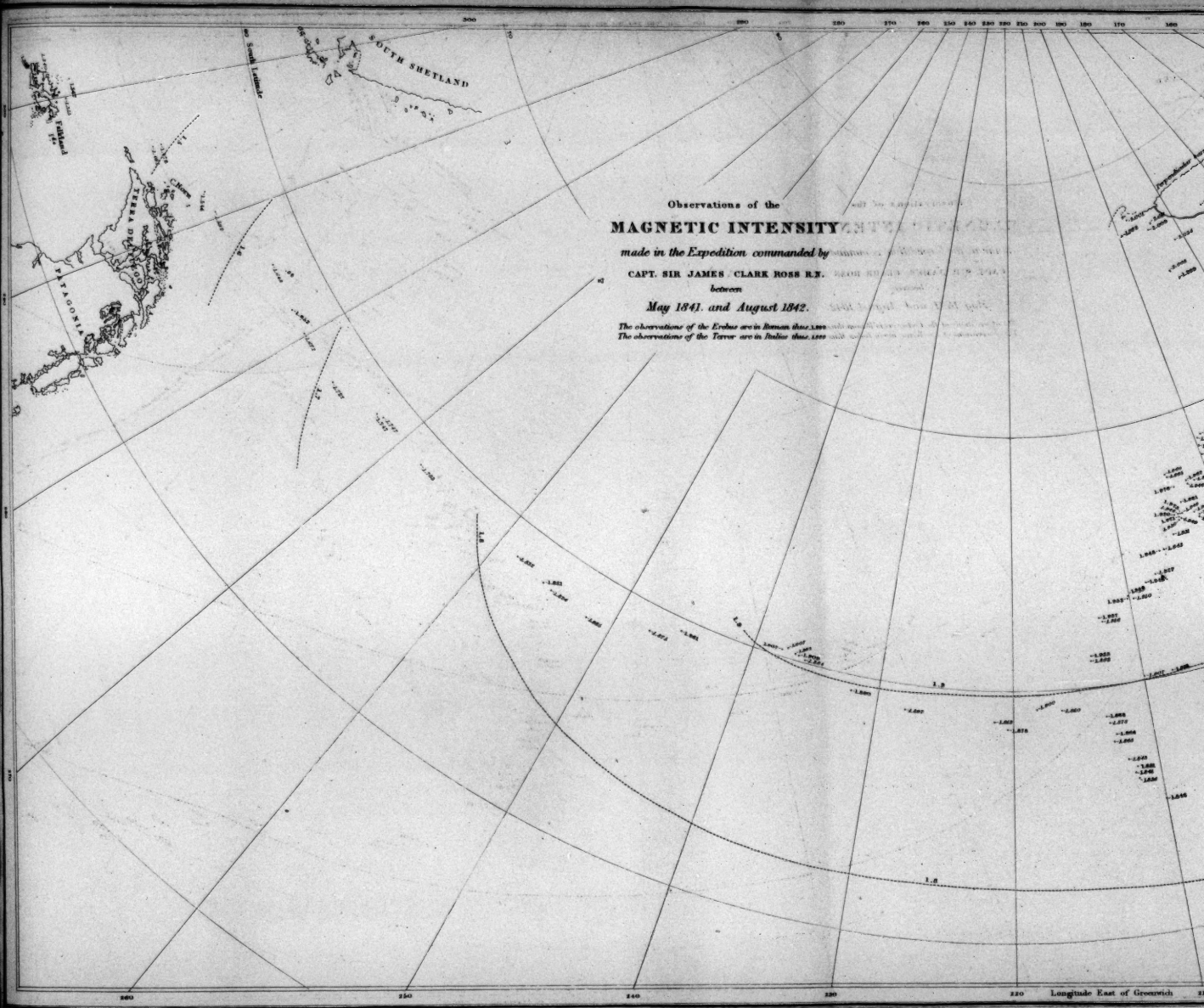

SOUTH VICTORIA
Northern boundary of the Antarctic Circle
Campbell I.
Auckland Group
Antipodes I.
Bounty Is.
Chatham I.
NEW ZEALAND
Cape Farewell
Bay of Islands
Royal Company's Is.
VAN DIEMEN'S LAND
BASS STRAIT
AUSTRALIA
South Latitude
Longitude East of Greenwich
J.&C.Walker Sculp.


Observations of the
MAGNETIC INCLINATION
made in the Expedition commanded by
CAPT. SIR JAMES CLARK ROSS R.N.
between
May 1841. and August 1842.
The observations of the Erebus are in Roman thus.. 90.30.
The observations of the Terror are in Italics thus.. 90.30.
SOUTH SHETLAND
South Latitude
PATAGONIA
TERRA DEL FUEGO
Falkland Is.
-80°
-75°
-70°


SOUTH VICTORIA
AUSTRALIA
TASMANIA
Eastern boundary of the determinations of the preceding year
Longitude East of Greenwich

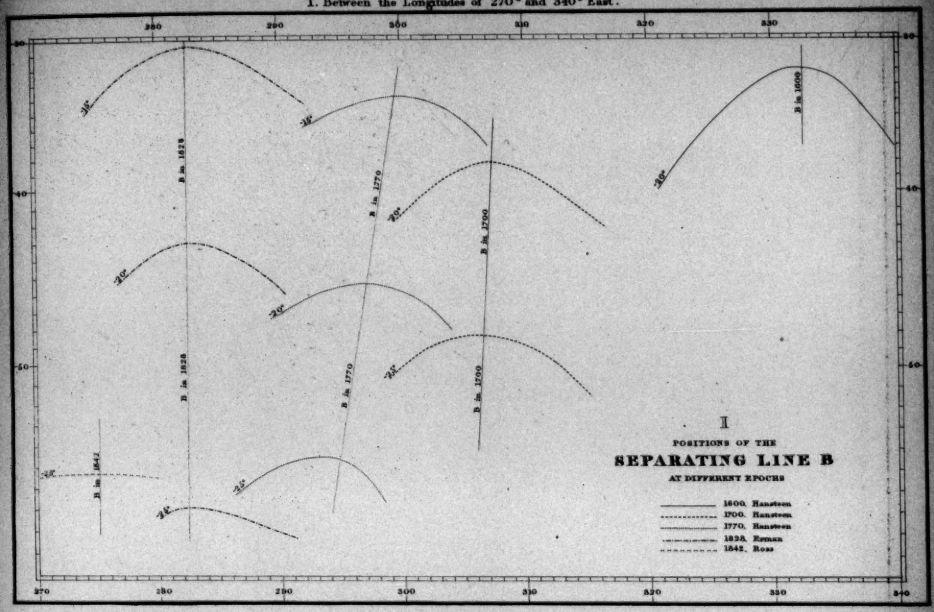


J.& C. Walker Sculp.t


Observations of the
MAGNETIC INTENSITY
made in the Expedition commanded by
CAPT. SIR JAMES CLARK ROSS R.N.
between
May 1841. and August 1842.
The observations of the Erebus are in Roman thus 1.000
The observations of the Terror are in Italics thus 1.000
SOUTH SHETLAND
TERRA DEL FUEGO
PATAGONIA
Falkland Is.
Cape Horn
South Latitude
Longitude East of Greenwich

Plate, shewing the progressive westerly movement of the Magnetic Phenomena in the Southern Pacific Ocean.

1. Between the Longitudes of 270° and 340° East.



2. Between the Longitudes of 200° and 270° East.

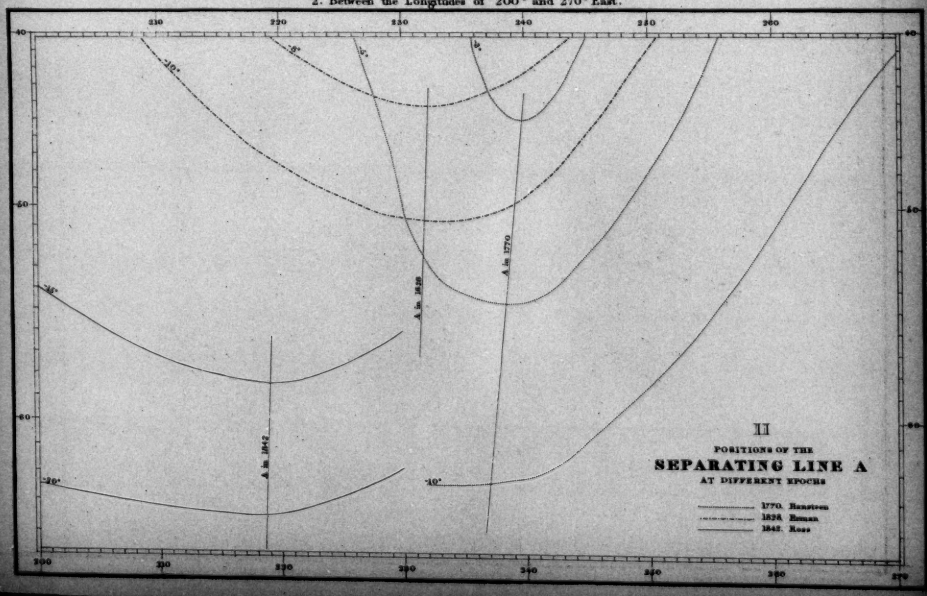
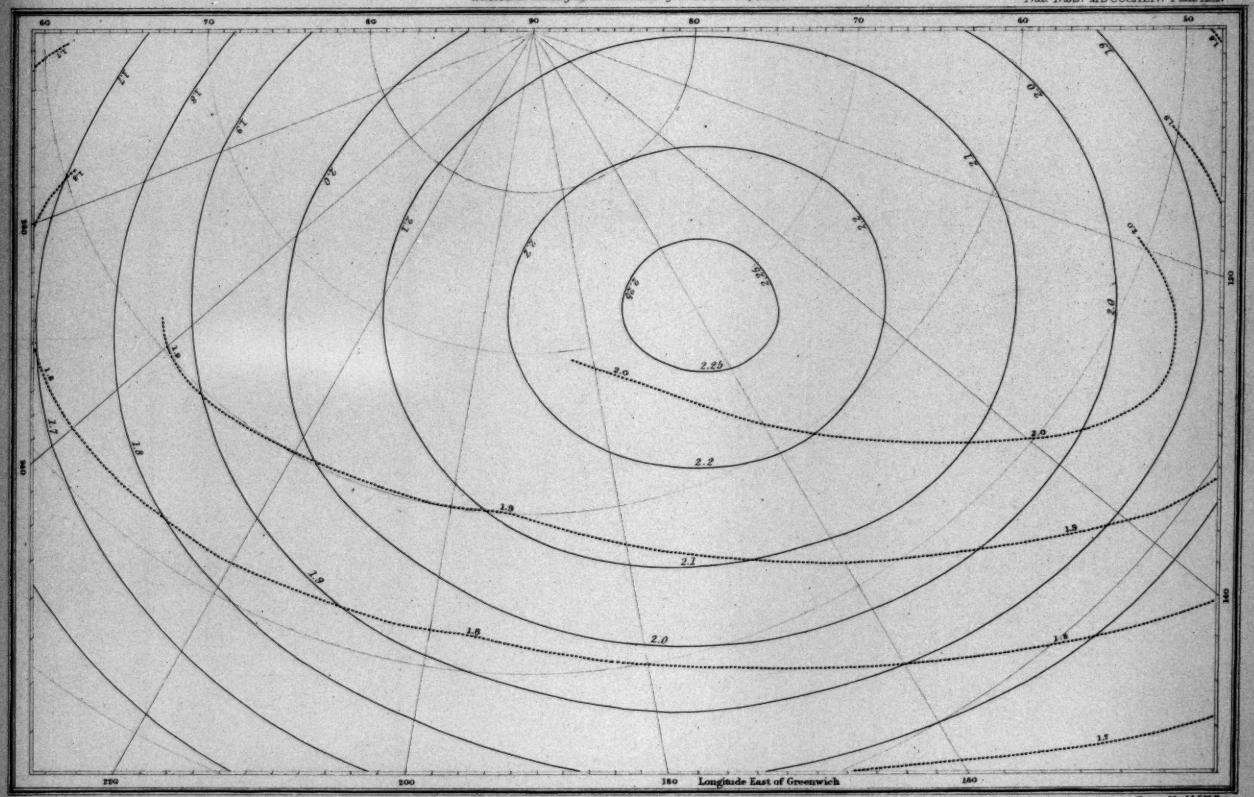


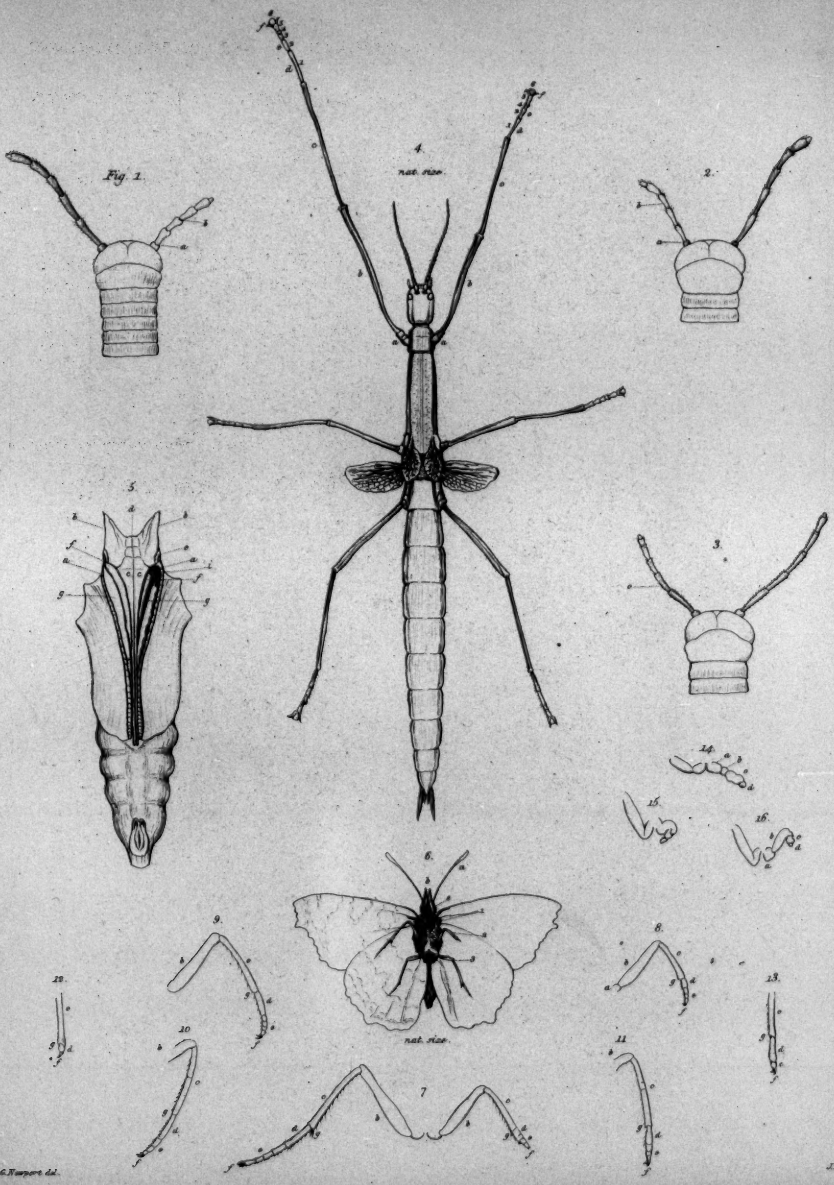
PLATE SHOWING THE LINES OF EQUAL INTENSITY DEDUCED FROM THE OBSERVATIONS OF THE ANTARCTIC EXPEDITION IN COMPARISON WITH M. GAUSS'S THEORETICAL LINES.

——— *M. Gauss's theoretical Lines*
- - - - - *Lines deduced from the Observations of the Antarctic Expedition.*



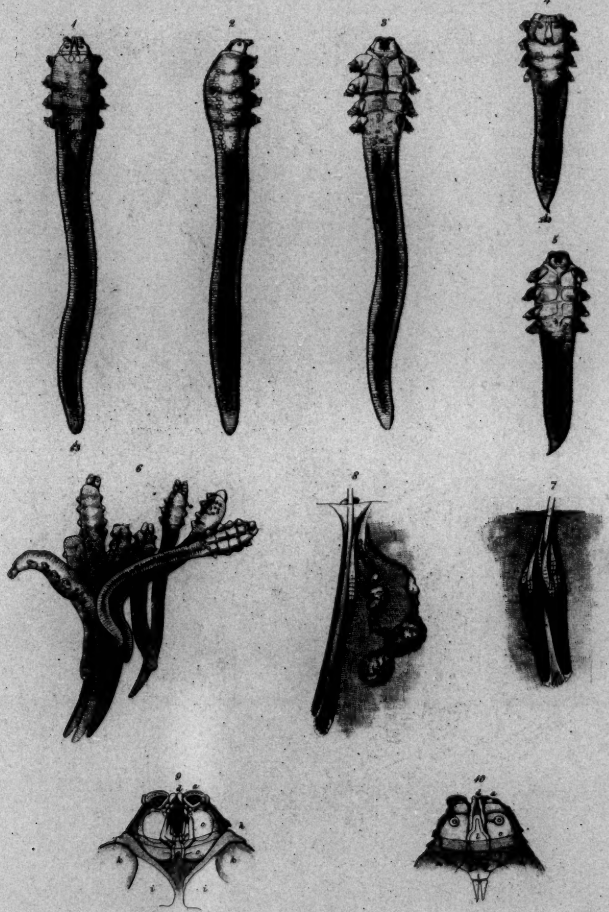
Engraved by J.& C.Walker.

Reproduction of lost parts in Myriapoda and Insecta.



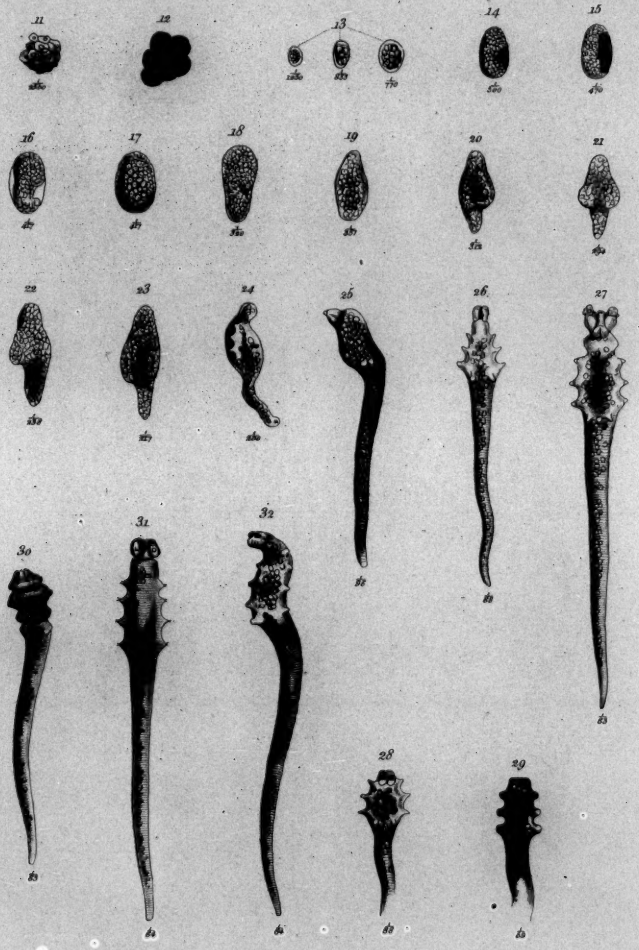
G. Newport del.

J. Basire sc.



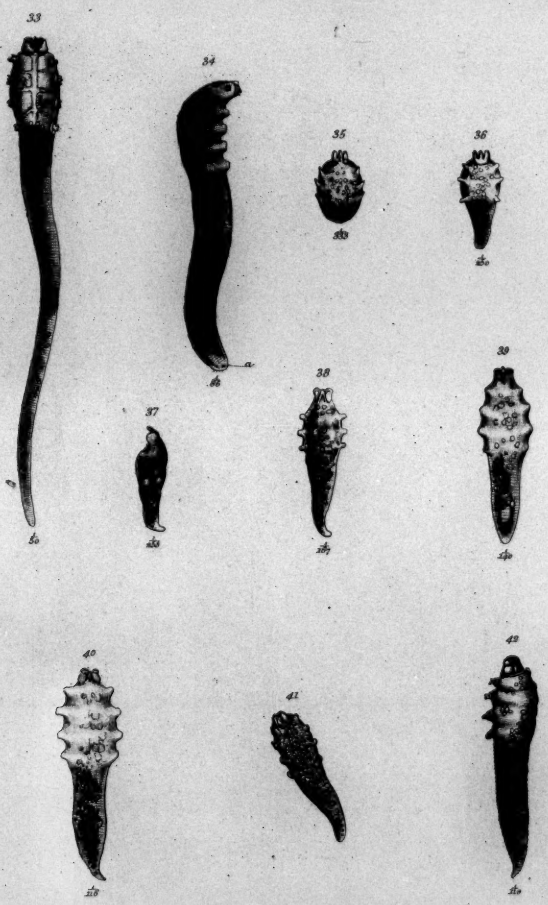
W. Bagg at Erasmus Wilson. del.

J. Basire. sc.



Erasmus Wilson del.

J. Basire sc.



Erasmus Wilson. del.

J. Basire. sc.

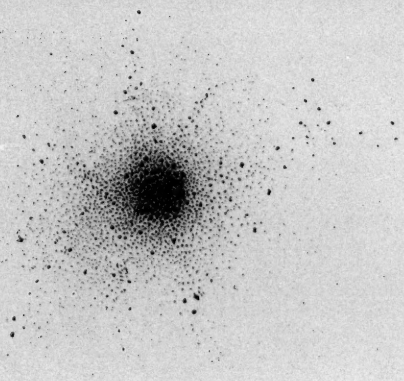


Fig. 88. R.A. 22^h 25′
Dec. 1° 34′ South.

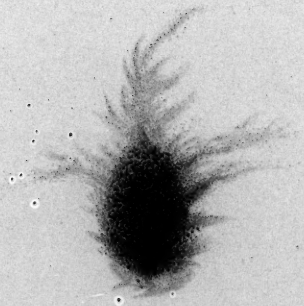


Fig. 81. R.A. 5^h 24′
Dec. 21° 58′ North.

Fig. 26. R.A. 19h 52′
Dec. 32° 49′ North.

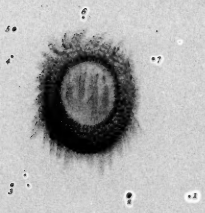


Fig. 29. R.A. 18h 47′
Dec. 32° 49′ North.

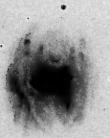


Fig. 47 R.A. 20h 15′
Dec. 29° 34′ North.

J. Basire sc.